SPRING 1981

Microcomputer Systems
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MAJOR NEW SOFTWARE:
CROMIX O/S and 'C' Compiler

Cromemco™
Tomorrow's computers today

Cromemco's offices, laboratory and manufacturing facility are located in these modern buildings in the heart of "silicon valley," the well-known electronics/semiconductor center on the San Francisco Peninsula. Up-to-the-minute production methods and automatic test equipment are used to achieve highest product reliability.

CROMEMCO FOR QUALITY AND PERFORMANCE

Complete Systems - Memory - I/O cards - Software

Cromemco, Inc., specializes in quality computers and high-performance computer support products in the microcomputer field.

These products are designed around the industry-standard S-100 bus.

Our products range from complete computer systems (see the System Two, System Three and Z-2H in this catalog) and color graphics systems (Z2H/GS) through more basic configurations (System Zero) to add-on-memory and I/O cards.

Lastly, an especially wide range of system and application software lets the user choose from an extremely broad equipment-software combination to best meet his present (and future) needs.

Cromemco software support is, in fact, widely recognized as the best and strongest in the field. A full section of this catalog is devoted to our broad line of software, while more is coming all the time.

For applications where quality and performance count, you can depend on Cromemco. Cromemco is the industry leader in quality and reliability as determined by a recent independent industry-wide survey.

CROMEMCO IS THE STANDARD

Cromemco products have come to be known as the benchmark of the field. In a recent independent report* Cromemco received such comments as "Our survey revealed totally satisfied business users" . . . "users' impressions were extremently favorable" . . . "the data storage system . . . received an 'outstanding' rating."

**Benchmark Report,* April, 1980; Association of Computer Users.

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NEW ASSOCIATION OF CROMEMCO USERS

An independent new organization known as the International Association of Cromemco Users has recently been announced.

The Association publishes a bi-monthly magazine, *I/O News*, that contains information of interest to all Cromemco users.

For application information, contact:

The International Association
of Cromemco Users
P.O. Box 17658
Irvine, CA 92713

Section I

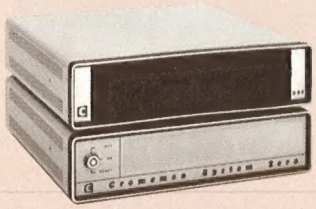
Computer Systems

Cromemco offers you a wide choice in high-capability computers with outstanding features such as high speed, many card slots to allow for broad system expansion, wide card support, fast memory and our much-admired Cromemco software.

Further, Cromemco computers are of a rugged, all-metal construction that immediately tells you these computers are built to be dependable and long-lived.

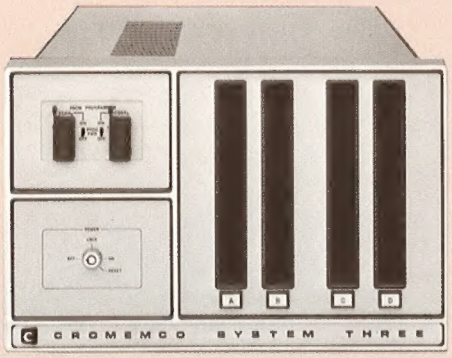
OBSOLESCENCE INSURANCE

The nature of their construction also promises versatility and long life. Built with easily-accessible card slots, these computers can be configured to meet the needs of an almost endless variety of applications.



SYSTEM ZERO WITH DDF

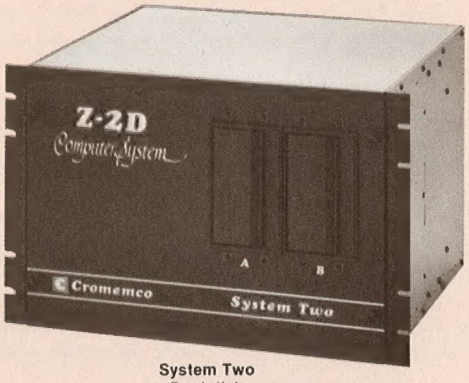
Two disks
Up to 128 Kilobytes of RAM/ROM
Up to 780 Kilobytes of disk storage



System Three
Two to four disks
Up to 512 Kilobytes of RAM/ROM
Up to 4.8 Megabytes of disk

Model Z-2H
11 Megabytes of hard disk storage
Up to 512 Kilobytes of RAM/ROM
Up to 780 Kilobytes of floppy disk storage

Model Z-2
Up to 512 Kilobytes of RAM/ROM



System Two
Dual disk
Up to 512 Kilobytes of RAM/ROM
Up to 780 Kilobytes of disk storage

System Zero Computer

SYSTEM ZERO/D WITH DDF DISK DRIVE

- **Small but powerful**
- **Up to 780K bytes of diskette storage**
- **Self-test diagnostics**

Here is a small-sized new computer that is especially suited to dedicated as well as general applications.

The computer comes in two versions. For one version there is a matching dual-diskette drive.

BASIC SYSTEM ZERO

The basic System Zero is provided with our fast, powerful Z80A-based single card computer, one kilobyte of RAM memory, and our 3K Control BASIC in ROM memory.

This arrangement gives you a basic configuration in which you also have three extra card slots on the S-100 bus for use in tailoring the system to your particular purpose.

We also offer a wide range of computer cards such as memory, interfaces, etc., which can be used in these slots (see Section III).

The basic System Zero is designed for ROM-based programs but the system can be expanded, by adding additional memory and disk interface cards, to take full advantage of Cromemco floppy and/or hard-disk systems. The System Zero/D (next column) is a special configuration of the System Zero ready for use with floppy disks.

SYSTEM ZERO/D

The "D" version of the System Zero is specially suited to be operated with the Model DDF drive to give you considerable computer power and storage capability in a small physical package.

The System Zero/D includes the Cromemco Z80A-based card computer as well as 64K of fast RAM. In addition, there is our new disk controller that itself has exceptional features.

First, the controller permits use of the high-capacity disk drives storing 390 kilobytes on each 5-inch diskette (780 kilobytes total).

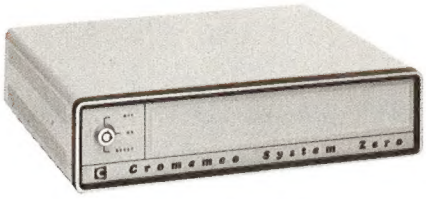
Next, the controller has on-board our new resident disk operating system RDOS-2 which gives you the ability to read or write single-sided, double-sided, single-density or double-density diskettes.

RDOS-2 also has a number of powerful, simple commands and other features including a printer driver.

SELF-TEST DIAGNOSTICS

With this controller in the System Zero/D, you also get system diagnostics in the RDOS-2 program. This enables a quick self-test of the computer-plus-drive system to see that memory, the controller, and the drives are properly functional.

System Zero Computer (cont'd)



SYSTEM ZERO COMPUTER

MODEL DDF DISK DRIVE

MODEL DDF DISK DRIVE

This new dual disk drive is housed in a small cabinet matching that of the System Zero/D.

The DDF uses 5-inch diskettes, either single- or double-sided and either single- or double-density.

TERMINAL/PRINTER

The System Zero/D can be used with virtually any terminal and/or printer including those described in Section II of this catalog.

TECHNICAL SPECIFICATIONS

System Zero Computer

Processor: 4 MHz version Z80-A
Cycle time: 250 nanoseconds
Minimum instruction execution time: 1 microsecond
Instruction set: 158 instructions including the 78 instructions of the 8080
System bus: industry standard S-100
Board capacity: 4 boards
Boards supplied: SCC
RAM memory: 1K byte
ROM capacity: 8K bytes
Firmware provided: MCB-216
Power: operates from 110/120/220/240 volts; 50/60 cycle
Operating environment: 0-55°C
Dimensions: 14.2''W x 3.45''H x 13.4''D
Weight: 15 lbs.
Mounting: cabinet; optional rack-mount brackets available

PRICE

System Zero Computer . . . . . $1295.

System Zero/D Computer

Processor: 4 MHz version Z80-A
Cycle time: 250 nanoseconds
Minimum instruction execution time: 1 microsecond
Instruction set: 158 instructions including the 78 instructions of the 8080
System bus: industry standard S-100
Board capacity: 4 boards
Boards supplied: SCC, 64KZ, 16FDC
RAM memory: 64K bytes
ROM capacity: 8K bytes
Firmware provided: RDOS-2
Power: operates from 110/120/220/240 volts; 50/60 cycle
Operating environment: 0-55°C
Dimensions: 13''W x 4''H x 13''D
Weight: 20 (9kg)
Mounting: cabinet; optional rack-mount brackets available

PRICE

System Zero/D Computer . . . . . $2995.

Model DDF Disk Drive

Disk drive capacity: 2 drives
Diskette size: 5-inch
Diskette sides: single or double
Diskette density: single or double (software selectable)
Formatted disk capacity:
Single-sided, single density: 83K bytes
Single-sided, double density: 190K bytes
Double-sided, single density: 173K bytes
Double-sided, double density: 390K bytes

Power: operates from 110/120/220/240 volts; 50/60 cycle
Operating environment: 10-40°C
Dimensions: 14.2''W x 3.45''H x 13.4''D
Weight: 15 lbs.
Mounting: cabinet; optional rack-mount brackets available

PRICE

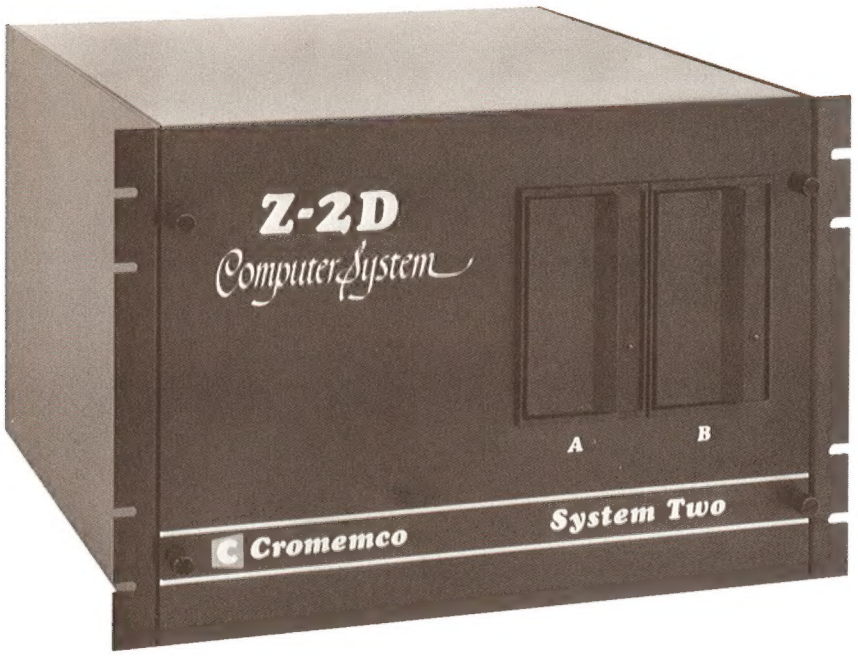
Model DDF Disk Drive . . . . . $1295.

Rack-Mount Brackets

For use with CS-0, CS-0/D, or DDF. Model RMB-0 . . . . . $35.

System Two Disk Computer

Now with quad-capacity disk drives



An advanced professional microcomputer with all the features you want including a two-disk drive

The Cromemco System Two is a real workhorse — a highly professional computer system that gives you the performance you want in professional work.

Besides its two-disk drive, the System Two gives you our well-known 4 MHz Z-80A CPU circuitry, our proven chassis with its 21-card shielded motherboard that lets you plug in an almost endless variety of memory, I/O, and peripheral interfaces.

Thus, you can tailor the computer to your particular job whether in the laboratory, the business office, the factory production line or process control, or in education work.

System Two Disk Computer (cont'd)

Here are some of the features you get in the Cromemco System Two computer:

- Two 5-inch quad-capacity (i.e. double sided, double density) disk drives with a combined storage capacity of 780 kilobytes
- Fast μP circuitry (4 MHz or 250-nanosecond cycle time).
- The power and convenience of the well-known Z-80 microprocessor chip.
- A full-length *shielded* motherboard with 21 card slots to let you plug in almost any conceivable combination of memory, I/O, or your own custom circuits.
- An extremely heavy duty power supply providing 30A from +8V and 15A from +18 and −18V. This will not only power a full set of 21 cards but also has ample additional power for other peripherals such as a floppy disk drive.
- Power-on jump circuitry to begin automatic program execution when power is turned on.
- S-100 bus — important because it is widely supported by a host of peripherals manufacturers. Thus you get the widest possible array of compatible peripherals.
- All-metal chassis and dust case.
- Card retainer that secures cards in sockets.
- Standard rack-mount style construction suited to dedicated applications. Upward compatible with larger systems. Usable with a variety of cabinets. Bench cabinet optional.
- 110 or 220-volt operation.

ADVANCED CONTROLLER CARD

Included in the System Two is our powerful 16FDC disk controller card that controls the two built-in disk drives and still has the capacity to control two extra drives. Here are some of its features:

- Capability to handle up to 4 disk drives
- A disk bootstrap Monitor (RDOS II) in a 4K ROM
- An RS-232 serial interface for interfacing your CRT terminal or teletype
- LSI disk controller circuitry

We've been able to put all of these features including a UART for the CRT interface on just one card because we've designed and constructed the controller with LSI circuitry. Our new RDOS-II monitor also contains extensive system diagnostic software for ease of system trouble-shooting.

Note, too, the heavy-duty 30-ampere power supply in the System Two that can handle this circuitry with ease.

POWERFUL PERFORMANCE AT A MODERATE PRICE

The Cromemco System Two offers features that make it the solution to many professional computer applications at what is indeed a moderate price:

Model CS-2 Computer System fully tested as a unit after our standard 'burn-in' procedure $4695

System Two Disk Computer (cont'd)

SOFTWARE SUPPORT

Cromemco is committed to extensive software support for our computers and we offer an extensive variety of programs at present. Here is a partial list of software now available; more becomes available all the time. Details of this software are given in Section IV of this catalog.

The following is on standard IBM-format soft-sectored mini diskettes (5-inch):

SYSTEM SOFTWARE

- 16K BASIC (Model FDB-S) $195
- 32K Structured BASIC (Model STB-S) $295
- FORTRAN IV (Model FDF-S) $295
- RATFOR with FORTRAN IV (Model FDR-S) $395
- Z-80 Assembler (Model FDA-S) $295
- COBOL (Model FDC-S) $595
- Data Base Management System (Model DBM-S) $395
- Word Processing System (Model WPS-S) $295
- C Compiler $595
- LISP $395
- CROMIX $595
- General Ledger $995
- Accounts Receivable $995
- Accounts Payable $995
- Inventory $995
- SDI Graphics Software $595

TECHNICAL SPECIFICATIONS

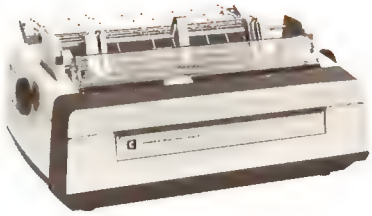
System Two Disk Computer System

Processor: 4 MHz version Z-80
Cycle time: 250 nanoseconds
Minimum instruction execution time: 1 microsecond
Instruction set: 158 instructions including the 78 instructions of the 8080
System bus: Industry standard S-100
Board capacity: 21 boards
Boards supplied: ZPU, 16FDC, 64KZ, PRI
Disk drive capacity: 2 drives (supplied)
Disk storage capacity: 390K bytes each disk
RAM memory: 64K bytes
Printer interface: Supports Cromemco dot-matrix or fully-formed-character printers
ROM firmware: 4K bytes
Serial interface: RS-232 or current loop; 110 to 76,800 baud. Supports Cromemco CRT terminal.
Parallel interface: 8 bit TTL levels
Power supply: +8 volts @ 30A, +18 volts @ 15A, −18 volts @ 15A
Power: Operates from 110/220 volts; 50/60 cycle
Operating environment; 10°-40°C
Dimensions: 12¼"H x 19"W x 20¾"D (31.1 x 48.3 x 52.7 cm)
Weight: 49 lbs (22 kg)
Mounting: For rack mounting (optional cabinets available)

System Two Disk Computer (cont'd)

PRINTERS/TERMINAL

Cromemco offers a range of printers and a 'smart' terminal for the System Two. See Section II of this catalog.



Z-2 Computer System

Z-2 COMPUTER SYSTEM

The Model Z-2 is a building-block computer. It includes the Z-2 chassis and a heavy-duty power supply. No circuit cards are included.

The computer further includes spaces for 21 circuit boards so that you can install memory, I/O, or custom circuits as your needs require.

PRICE

Model Z-2X Computer . . . . . $995.
Model Z2-CAB Bench Cabinet . . . . . $295.

Z-2 is supplied for rack mounting.
Attractive bench cabinet shown is also available.

TECHNICAL SPECIFICATIONS
Z-2 COMPUTER SYSTEM

System bus: industry standard S-100
Board capacity: 21 boards
Power: Operates from 110/220 volts; 50/60 cycles.
Power supply: +8 volts @ 30A, +18 volts @ 15A, −18 volts @ 15A
Operating environment: 0-55°C

Dimensions: 12¼" H x 19" W x 20¾" D (31.1 x 48.3 x 52.7 cm)
Weight: 39 lbs (18 kg)
Mounting: For rack mounting (optional bench cabinet available)

Z-2H Hard Disk Storage Computer System

THE FIRST COMPUTER TO OFFER AN INTEGRAL 11-MEGABYTE HARD DISK SYSTEM

- 11 Megabytes of hard disk storage
- Under $10,000
- Fast transfer rates
- Two quad-capacity floppy disk drives
- 64K RAM memory

Cromemco's new Model Z-2H not only incorporates an 11-megabyte hard disk drive but also offers the other features you have come to expect from Cromemco. These include large and expandable memory, fast Z-80A processor, rugged construction and broad software support.

This S100-bus computer has a motherboard with 12 slots, 5 of which are occupied by the cards supplied with the computer. Thus, you have 7 slots to use for additional Cromemco cards (such as for additional RAM and interface cards) or for special cards suited to your particular application.

The power supply in the Z-2H is more than ample for nearly any card complement, providing more than 15A at +18V, 15A at −18V, and 30A at +8V.

FEATURES

Model Z-2H Computer

- Fast Z-80A 4 MHz processor
- 11-megabyte hard disk drive
- Two floppy disk drives
- 64K RAM memory
- RS-232 special interface
- Printer interface
- Extensive software available

ADVANCED HARD DISK SYSTEM

The hard-disk system in the Model Z-2H both has large storage and is extremely fast. Eleven megabytes unformatted can be stored. File transfers to and from the hard disks occur from 6 to 10 times faster than is commonly seen in floppy disk systems.

The information transfer rate to and from the disk is 5.6 megabits/second using the fast DMA controller supplied in the Z-2H computer.

64K RAM SUPPLIED

The Model Z-2H is provided with a full 64K of high-speed RAM memory using one of our highly-praised 64KZ RAM memory cards. With 64K of RAM memory you are sure to have enough for most any application whether it be in business, scientific, engineering, or process control applications.

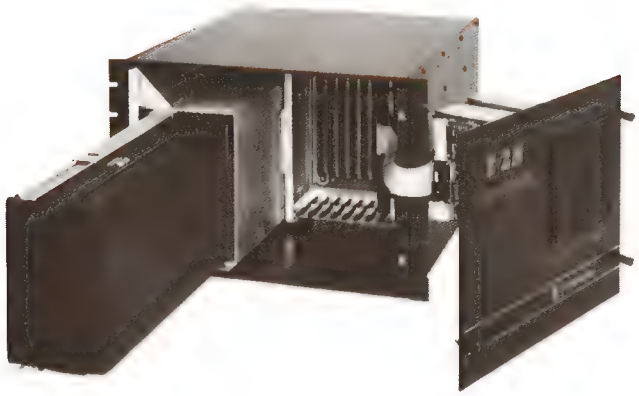
RAM EXPANDABILITY

Even the 64K RAM is greatly expandable, however, since you can add additional RAM to give you as much as 512K bytes of RAM using our Cromemco Model 64KZ RAM cards.

PRINTER INTERFACE STANDARD

Every Z-2H is also supplied with a Cromemco Model PRI printer interface card. This card supports the Cromemco dot-matrix printers as well as our fully-formed character printer.

Z-2H Hard Disk Storage Computer System



SOFTWARE SUPPORT

With the Z-2H you have access to the full range of Cromemco software — software widely regarded to be the finest in the industry including:

- FORTRAN IV
- Extended BASIC
- Structured BASIC
- COBOL
- RATFOR
- Z-80 Macro Assembler
- Word Processing System
- Data Base Management System
- LISP
- CROMIX
- Business application software
- SDI Graphics Software
- C

See the complete list in section IV of this catalog.

RELIABILITY/CONSTRUCTION

The disks and drive are housed in a sealed chamber (photo) so that the user has no need to provide filtered air for the unit. The chamber holds two rotating disks that provide 3 data surfaces.

To achieve fast transfer rates, the disks rotate at 3600 rpm and have a rotational latency of just 8.3 milliseconds. Head positioning is done with a linear actuator mechanism which is much faster than stepping motors and which achieves an average disk access time of only 50 msec.

Precise head positioning is achieved by using a servo track follower which is located on the fourth disk surface. Head positioning is thus maintained precisely despite temperature or humidity variations.

Servo track following also permits the system to operate in various orientations — there is no need to level the unit before using.

Head tracking pressure is very light—just 10 grams—thereby virtually eliminating the source of "head crashes" common with other disk drives.

The 11 megabytes of storage in this compact drive is achieved by using a low head flying height of 19 microinches. This low height coupled with the precise servo track positioning allows a radial data density of 5868 bits per inch and an axial density of 300 tracks per inch.

PRICE

Hard Disk Computer System (Model Z-2H) $9,995

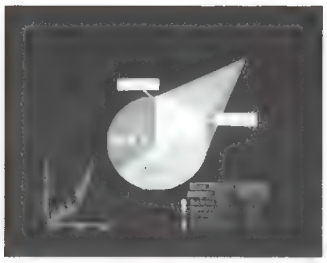
TECHNICAL SPECIFICATIONS
Model Z-2H Hard Disk Computer System

Processor: 4 MHz Z-80A
Cycle time: 250 nanoseconds
Minimum instruction execution time: 1 microsecond
Instruction set: 158 instructions including the 78 instructions of the 8080
System bus: Industry Standard S-100
Card capacity: 12 cards
Standard card complement: Cromemco ZPU, 16FDC, 64KZ, PRI, and WDI
Number of floppy disk drives: 2 quad-capacity drives
Floppy disk storage capacity: 390K bytes each disk (780K total)
Hard disk drive storage capacity: 11 Megabytes
ROM firmware: 4K bytes
Serial interface: RS-232 or current loop, 110-76,800 baud. Supports Cromemco CRT terminal.
Printer interface: Supports Cromemco dot-matrix or fully-formed character printer.
RAM memory: 64K Bytes
Power: Operates from 110/220 volts; 50/60 cycle; 600 watts
Dimensions: 12¼"H x 19"W x 20¾"D (31.1 x 48.3 x 52.7 cm)
Weight: 90 lbs. (41 kg)
Mounting: For rack mounting (optional cabinets available)

Data subject to change without notice.
Prices f.o.b. Mountain View, CA

High-Performance Color Graphics System

- A professional color system
- High resolution
- A powerful computer
- NTSC conformance
- A low price



PROFESSIONAL COLOR DISPLAY

The Cromemco Color Graphics System gives you professional level resolution, enormous color range, easy-to-use software instructions, a powerful computer, NTSC conformance and a low price.

In short, it gives a highly-flexible color graphics display and unusual computer power at a price far below that of comparable systems.

The computer has 11 megabytes of hard-disk storage in a fast Z80A-based desk-top type unit. It further offers two 5'' floppy disks that provide an additional 800 kilobytes of storage. This computer is also usable with a range of Cromemco peripherals.

EASY COLOR/FORM SELECTION

The range of color choices is enormous. Colors can be software-selected from a color menu of 4096 choices.

Selection of colors and of common geometric forms is done with simple software instructions like DEFCLR (c, R, G, B) and XCIRC (x, y, r, c).

HIGHEST RESOLUTION

The high resolution of 754 x 482 pixels in a system that conforms to NTSC standard RS-170. In fact, the resolution exceeds that of a color TV picture and is the highest possible in an NTSC-conforming display. The NTSC conformance makes the system useful in TV work.

The speed of the system is impressive. It contains two special pages of image memory (48K each) that operate to give independent fast access to the computer memory. Each of these 48K display memories can store a full picture, permitting fast computer operation during display and further permitting special effects such as windowing and scrolling.

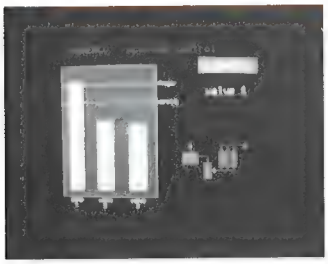
OTHER FEATURES

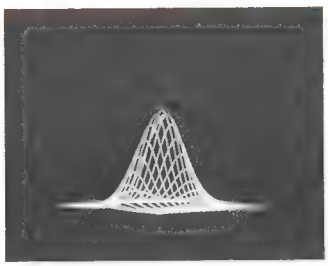
The system includes such other features as a printer interface to operate with either dot-matrix or character printer and an auxiliary serial interface to permit operation with an X-Y digitizer.

RGB MONITOR

A quality RGB monitor is available for use with the Z2H/GS. This is a 13'' monitor, Model RGB-13.

High-Performance Color Graphics System





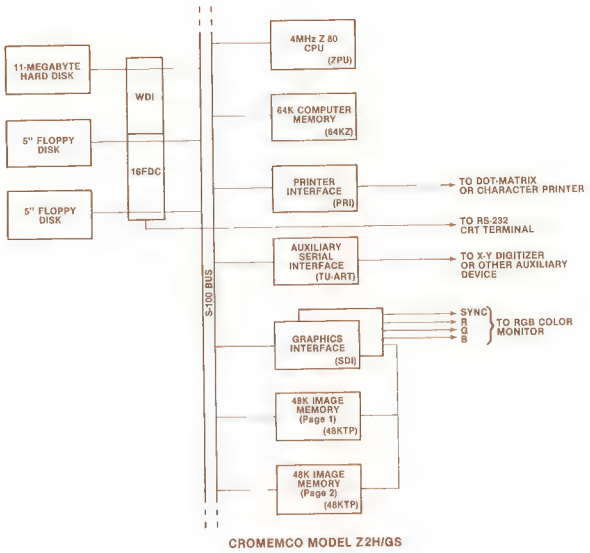
SOFTWARE

The Cromemco graphics software package is included with the system.

This graphics system can be used to display color or black-and-white images or both simultaneously.

The subroutine calls include such conveniences as:

- fast line generation
- fast generation of shapes such as circles, rectangles and polygons
- area fill of these shapes in a designated color at video rates
- text generation and rotation
- the ability to open and close windows in the memory page being displayed
- the ability to simulate motion (animation)
- the ability to CLIP which eliminates problems that might arise from trying to plot outside the screen area
- the ability to scale the display area of the work page



CROMEMCO MODEL Z2H/GS

TECHNICAL SPECIFICATIONS
Model Z-2H/GS Color Graphics System

MODEL Z-2H/GS COMPUTER

Processor: 4 MHz Z80A
Cycle Time: 250 nanoseconds
Minimum Instruction Execution Time: 1 microsecond
Instruction Set: 158 instructions including the 78 instructions of the 8080
System Bus: Industry Standard S-100
RAM Memory: 64K bytes
Board Capacity: 12 cards
Boards Supplied: ZPU, 16FDC, 64KZ, PRI, SDI, TRT, (2) 48 KTP
Mapping Modes: Bit or nybble; software selected
Resolution: 754 x 482 pixels maximum using 48K display memory. 12K display memory may also be used at lower resolution.
Video Outputs: Three analog outputs for R/G/B monitor.
Sync Signal: Composite Sync signal is switch-selectable. Separate RS-170 Sync signal available.
Number of Floppy Disk Drives: 2
Hard Disk Drive Capacity: 11 Megabytes
ROM Firmware: 4K Bytes
Serial Interface: RS-232 or current loop, 110-76, 800 baud. Supports Cromemco CRT terminal.
X-Y Digitizer Interface: RS-232
Printer Interface: Supports Cromemco dot-matrix or fully-formed character printers.
Display Memory: 2 pages (image planes) of 48K.
Power: Operates from 110/220 volts; 50/60 cycle; 600 watts
Dimensions: 12¼"H x 19"W x 20¾"D (31.1 x 48.3 x 52.7 cm)
Weight: 90 lbs. (41 kg)
Mounting: For rack mounting (optional cabinets available)
Price: $14,500

MODEL RGB-13 COLOR MONITOR

CRT: 13" shadow mask, delta gun
Technology: All solid state except for CRT.
Video signal input: RGB 0.3 - 2.0 v., 75 ohm. Fully compatible with Cromemco model SDI interface outputs.
Video amplifier bandwidth: 50 Hz to 15 MHz ± 3 db
Power requirements: 120 or 220 volts 50/60 Hz.
Power consumption: 250 VA
Weight: 20 Kz
Operating Environment: –5° to 40°C
Price: $2,995.

System Three Disk Computer

Now with quad-capacity disk drives — Up to 4.8 megabytes of storage

The power, speed, and expandability you need for business, science, industry, education

Here's a microcomputer with the features you want and need to do professional work in almost any field: engineering, science, business/accounting, word processing, data-based management, education, medicine, and others.

In the microcomputer field the new Cromemco System Three stands alone in the range of features and capabilities it offers. The System Three consists of a fast, powerful, Z80-based microcomputer with capability for enormous RAM memory expansion and with provision for up to four floppy disk drives. No other microcomputer offers four drives.

The computer has a large 21-slot motherboard to accept a large variety of memory and I/O to suit virtually any application.

Further, Cromemco offers a wide range of plug-in memory and I/O for use with the computer.

Large, expandable memory

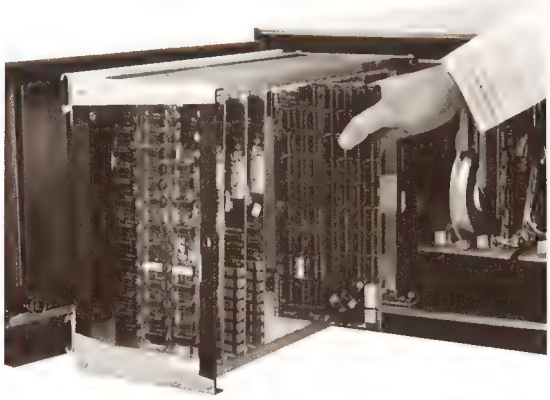
One of the most important aspects of a computer has proved to be its capability for memory expansion. Experience has shown over and over that the need for memory capacity is often difficult to assess at the start of a project and is typically underestimated.

Consequently, Cromemco has designed the System Three with generous provision for memory, both RAM and disk.

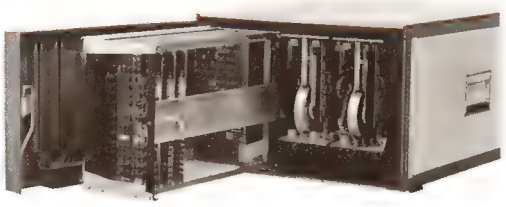
First, the unit is supplied with 64 kilobytes of RAM. This can be *expanded to 512 kilobytes in 8 banks.*

Next, the System Three is supplied with a dual disk drive providing 2.4 megabytes of memory. Using Option 002, this can be increased to 4.8 megabytes of magnetic storage.

With the System Three you have the security inherent in an enormously-expandable memory.



System Three computer is constructed so that hinged front panel swings open and motherboard/card cage slide out for easy insertion of circuit boards.



Retainer bar keeps circuit cards firmly in sockets.

System Three Disk Computer (cont'd)

System Three Features

- Z-80A microprocessor
- 64-kilobyte RAM
- Dual disk drive (four drive controller)
- Power-on-jump circuitry to begin automatic program execution when power is turned on
- RS-232 or current loop interface
- S-100 bus
- Heavy-duty 30 ampere power supply
- All-metal chassis and dust case
- Rack or optional bench cabinet mounting
- 110- or 220-volt operation

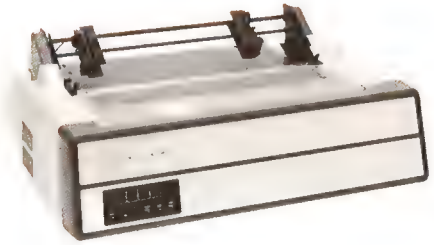
CRT terminal

Here is a high-capacity CRT terminal for use with your Cromemco computer system.

The terminal has a solid-state keyboard for long, reliable life and quiet operation.

It also has a separate numeric keypad and a cursor keypad.

Other features in the Model 3102 terminal include 20 software-assignable function keys and a local editing mode.



Fast line printer

The Model 3703 line printer available for the System Three prints at a maximum speed of 180 characters/second using its bi-directional printing.

Printing line width is 132 columns. Paper feed is tractor type. Prints both upper and lower case.

MULTI-USER CROMIX VERSIONS OF SYSTEM THREE COMPUTER

The System Three is available in a multi-user system that lets you do the tasks usually associated with much more expensive time-sharing computers.

You can have up to six terminals, a fast printer, a large RAM memory, and many more features. Check this system for speed—you'll be surprised.

Multi-user versions of the System Three are available to support from two to six users. In the accompanying price list the number following the slash indicates the number of users supported by the system. Prices include our CROMIX Multi-User Operating System.

CS3/2C $11,575
CS3/3C $13,070
CS3/4C $14,860
CS3/5C $16,355
CS3/6C $18,145

System Three Disk Computer (cont'd)

Disk protection

The System Three has several provisions for protection of disks from damage:

- The computer provides for ejection of disks under software control if desired.
- When the key switch is in the LOCK position, the eject buttons under the disks are disabled—an unknowing person can't eject the disks while they are running. Disks and programs are thus prevented from damage and loss.
- Disk loading and unloading are motor-driven, providing gentle handling of these long-life disks.

PROM programmer option for development work

Easy PROM programming is provided (option 001) right on the front panels of the System Three. In fact, *two* sockets are provided so that the memory in one PROM can easily be duplicated in a second one.

Broad Software Support

Following is some of the outstanding software support available to you for the System Three. More becomes available all the time.

- DATA BASE MANAGEMENT SYSTEM. This advanced software package can be used for inventory control, mailing lists, personnel records, order entry and other important business applications.

To create a data base, an operator simply specifies the field attributes, then the sorts by which the data can be retrieved (e.g., by state, by name, by state by city by name, etc.)

- CROMEMCO 16K DISK-EXTENDED Z-80 BASIC. This disk or PROM-based Extended BASIC was specifically designed to meet the most demanding requirements of business firms while also providing the flexibility and speed necessary for real-time control applications. It fully utilizes the extensive 158-instruction set of the Z-80 microprocessor to maximize computational precision (a full 14 digits), programming power, and speed of execution.
- COBOL. The Cromemco compiler contains all the features of Level 1 COBOL as defined by the 1974 ANSI standards as well as the most useful options of Level 2.

For example, this COBOL includes the verbs SEARCH, COMPUTE, STRING, and UNSTRING.

Our Cromemco COBOL also supports Computational-3 data to give more compact storage of decimal data.

- FORTRAN IV. Cromemco FORTRAN IV provides new capabilities for users of Z-80 based microcomputer systems. This is a complete implementation of ANSI standard FORTRAN X3.9-1966, except for complex data types.
- WORD PROCESSING SYSTEM. The Cromemco word processing system is a combination Screen Editor and Formatter for the quick preparation of professional looking documents.

Lines of text may be left- or right-justified or centered.

- Z-80 RELOCATABLE MACRO ASSEMBLER. This is a two-pass assembler which reads source code from a disk file, assembles it, and produces an object file either in relocatable format or in Intel hex format.
- 'C' is the language of choice for systems programming. It offers efficiencies comparable to those of assembly language while allowing full use of structural programming techniques. The C compiler operates only under the CROMIX operating system.
- LISP. A powerful programming language developed for artificial intelligence applications. Cromemco LISP embodies many advanced features.
- BUSINESS SOFTWARE. This includes General Ledger, Accounts Receivable, Accounts Payable and Inventory.

See Section IV of this catalog for more software and details.

System Three Disk Computer (cont'd)

DESKS AVAILABLE

Two handsome desks are available for your System Three. The larger desk accommodates the computer and terminal, and provides extra work surface as well.

The smaller desk is useful for a printer or terminal. Styling of both is suited to the nicest of office surroundings ● Larger desk (Model Z3-MDSK): $695.00. ● Smaller desk (Model Z3-SDSK): $395.00.

METAL DESK CABINET AVAILABLE

All-metal brown-trimmed beige cabinet for System Three Computer (Model Z3-CAB) . . . . . $295.

TECHNICAL SPECIFICATIONS AND PRICES

SYSTEM THREE COMPUTER (Model CS-3)

Processor: 4 MHz version Z-80A
Cycle Time: 250 nanoseconds
Minimum Instruction Execution Time: 1 microsecond
Instruction Set: 158 instructions including the 78 instructions of the 8080
System Bus: Industry standard S-100
Board Capacity: 21 boards
Boards Supplied: ZPU, 16FDC, 64KZ, PRI
Disk Drive Capacity: 4 drives (supplied with two drives)
Disk Storage Capacity: 1.2 megabytes each disk (2.4 MB with 2 drives; 4.8 MB with 4 drives).
ROM Firmware: 4K bytes
Serial Interface: RS-232 or current loop; 110 to 76,800 baud. Supports Cromemco CRT Terminal.
Printer Interface: Supports Cromemco Model 3709, 3703, or 3355A Printers.
RAM Memory: 64K bytes
Power supply: +8 volts @ 30A, +18 volts @ 15A, – 18 volts @ 15A
Power: Operates from 110/220 volts; 50/60 cycle
Operating Environment: 0-40°C
Dimensions: 12¼"H x 19"W x 20¾"D (31.1 x 48.3 x 52.7 cm)
Weight: 65 lbs
Mounting: For rack mounting (optional cabinets available)
Price, Model CS-3: $7995.

CRT TERMINAL (Model 3102)

Format: 80 characters/line; 24 lines; upper and lower case; solid state capacitive keyboard
Additional Capabilities: line editing; block mode transfer; 16 software-assignable function keys
Price: $2295

LINE PRINTER (Model 3703)

Format: 180 characters/sec.; 132 cols., 18" platen; impact printer. Bidirectional printing; tractor feed.
Price: $3195.

FULL-FORMED LETTER PRINTER (Model 3355A)

Format: 55 characters/sec; 15-inch platen; tractor feed and friction platen; quality impression suited to camera copy.
Price: $3495.

LINE PRINTER (Model 3779)

Format: 60 characters/sec.; up to 132 ch/line, 12" platen; impact printer; tractor feed.
Price: $1695.

OPTION 001 2708 PROM PROGRAMMER

Sockets: Two sockets for ease of PROM duplicating
Price: $495.

OPTION 002 DUAL DISK DRIVE

Capability: Provides for a total of four disk drives
Price: $3195.

Buyer's Guide

SYSTEM THREE BUYER'S GUIDE						
Model	ROM	RAM	CRT Terminal Serial Ports	Floppy Disk Drives	Printer Interface	Price
CS-3	4K	64K	1	2	yes	$ 7,995
CS3/2C	4K	192K	2	2	yes	11,575
CS3/3C	4K	256K	3	2	yes	13,070
CS3/4C	4K	320K	4	2	yes	14,860
CS3/5C	4K	384K	5	2	yes	16,355
CS3/6C	4K	448K	6	2	yes	18,145

NOTES: Any of the above systems can be increased to four floppy disk drives by adding option 002 ($3195 additional).

All Multi-User systems include 64K of RAM memory per user, as well as 64K for the operating system. All RAM memory has Extended Bank Select capability for future system expansion.

SYSTEM TWO BUYER'S GUIDE							
Model	ROM	RAM	CRT Terminal Serial Ports	Printer Interface	11-Megabyte Hard Disk	Disk Drives	Price
Z2-X	0	0	0	no	no	0	$ 995
CS-2	4K	64K	1	yes	no	2	4,695
Z-2H	4K	64K	1	yes	yes	2	9,995
CS2/2C	4K	192K	2	yes	no	2	8,275
CS2/3C	4K	256K	3	yes	no	2	9,770
CS2/4C	4K	320K	4	yes	no	2	11,560
CS2/5C	4K	384K	5	yes	no	2	13,055
CS2/6C	4K	448K	6	yes	no	2	14,845

NOTES: 1) All Multi-User systems include 64K of RAM memory per user as well as 64K for the operating system. All RAM memory has Extended Bank Select capability for future system expansion.

Z-2H price includes integral 11-megabyte hard disk drive. An 11-megabyte hard disk drive may be added to other systems by ordering Cromemco Model HDD-11 (price $6,995).

Section II

Computer Peripherals

Cromemco peripherals include a choice of:

- A crt terminal with such features as capacitive keyboards and software-assignable function keys
- Three printers with speeds up to 180 characters/second and up to 132 columns.
- 5-inch and 8-inch disk drives
- 11 Megabyte Hard Disk Drive

CRT Terminal

Model 3102

- 'Smart' terminal
- Detachable hermetically-sealed reed-switch keyboard
- Upper- and lower-case characters with descenders
- Graphic character set

'SMART' TERMINAL

Here's a high-capability, easy-to-use 'smart' CRT terminal especially designed for use for your Cromemco system.

The keyboard is constructed of hermetically-sealed reed switches for long, reliable life.

The terminal's many special modes and features are easily invoked by the host computer system for flexible operation.

COMPUTER INTERFACING

The terminal is interfaced to the computer bus either by a Cromemco TU-ART or Cromemco Model 4FDC interface card using a standard RS-232 interface.

PRICE

Model 3102 CRT Terminal; includes 10-foot cable terminated in DB-25P connector $2295

TECHNICAL SPECIFICATIONS

Model 3102

CRT Terminal

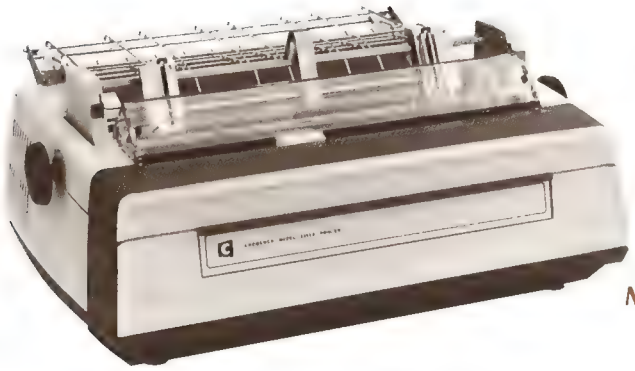
Format: 80 characters/line; 24-line display;upper- and lower-case characters with descenders; optional status line on 25th line.

Special Features: Addressable cursor with position query; cursor data query; second invisible cursor; 14-key numeric pad; graphics character set; line insert, delete; screen formatting including protected, arithmetic, and alphanumeric fields; partial screen lock; line lock; 20 user-definable function keys; time-of-day clock; software-selectable modes; half intensity, reverse video, underlined, and blinking character display; software down-loading capability.

Printers

Model 3703

Model 3779



Model 3355A

DOT-MATRIX OR FULL-LETTER

Here's a choice of three printers to use with your computer system.

Two dot-matrix units offer up to 180 characters/second print speed.

The full letter printer gives you high-quality printing comparable to quality electric typewriters and suitable for camera copy.

You can use this printer in applications such as printing business letters, guides, manuals, etc., where you wish the printed material to have a "finished" look.

WORD PROCESSING SOFTWARE

In many cases you will want to use the printer with our "Word Processing System" software. See the software section of this catalog.

PRICES

(All printers are supplied with a 10-foot cable terminated in a DB-25P connector.)

Model 3779 Dot-Matrix Impact Printer;
12-inch platen; 60 ch/sec $1695
Model 3703 Dot-Matrix Impact Printer;
18-inch platen; 180 ch/sec $3195
Model 3355A Full-Letter Impact Printer;
55 ch/sec $3495

TECHNICAL SPECIFICATIONS

Model 3779 Dot-Matrix Printer

Format: 60 characters/sec; 12-inch platen; continuously-variable character pitch allows up to 132 ch/line;
General: tractor feed accommodates roll paper and forms.

Model 3703 Dot-Matrix Printer

Format: 180 characters/sec; 18-inch platen; 132 columns.
General: form feed, bi-directional printing and double buffering for high-speed performance; tractor fed accommodates roll paper and forms.

Model 3355A Full Letter Printer

Format: 55 characters/sec; 15-inch platen.
General: tractor feed and friction platen; quality impression suited to camera copy.

HDD Hard Disk Memory System

- One or two drives (11 or 22 megabytes of storage)
- Fast transfer rates

LARGE, FAST-TRANSFER STORAGE

The large storage capability of this advanced new hard disk drive provides 11 megabytes unformatted or more than 10 megabytes of formatted data for each drive.

In addition, this drive has a fast information transfer rate of 5.6 megabits/second when used with the Cromemco DMA controller (provided).

File transfers to and from the disk occur from 6 to 10 times faster than is commonly seen with floppy disk systems.

RELIABILITY

The rotating disks are housed in a sealed chamber so that air filtering is not required. Servo track following is used to achieve precise head positioning under temperature and humidity variations. Further, leveling of the unit is not normally required.

The low head tracking pressure of only 10 grams virtually eliminates a source of "head crashes" common with other disk drives.

SOFTWARE SUPPORT

With the HDD you receive a copy of our new extended CDOS operating system. With extended CDOS you have access to the full range of Cromemco software—software widely regarded to be the finest in the industry.

Combining the new Model HDD Disk Drive with the Cromemco System Two Computer gives you a fast, powerful system with a Z-80A microprocessor, two floppy disk drives, up to 512 kilobytes of RAM and up to 22 megabytes of hard disk storage. The HDD can also be used with the Cromemco System Three or for additional disk storage with the Cromemco Z2-H.

TECHNICAL SPECIFICATIONS
Model HDD Hard Disk Drive

Storage capacity each drive: 11 megabytes (unformatted)
Data transfer rate: 5.6 megabits/sec.
Head positioner: linear actuator
Tracking mechanism: servo track following
Interface card: S-100 DMA interface
Rotational speed: 3600 RPM
Rotational latency: 8.3 msec
Number of data surfaces: 3 surfaces, sealed environment
Tracks per surface: 350
Head flying height: 19 microinches
Head tracking pressure: 10 grams
Average access time: 50 msec.
Power dissipation (each drive): 100 watts
Power requirements: 110/220 volts 50/60 cycle
Operating environment: 0-40°C; 10%-80% humidity (non-condensing)
Weight (w/one drive): 55 lbs (25 kg)
Weight (w/two drives): 88 lbs (40 kg)

PRICES

Price w/one drive (Model HDD-11): $6,995
Price w/two drives (Model HDD-22): $11,995

5" Dual Disk Drive
Quad Capacity

This new dual 5-inch disk drive gives a total storage of 780 kilobytes in a unit only 3½ inches high.

The large storage comes from the use of our new quad-capacity (double-density double-sided) drives.

However, either single-or double-sided and either single-or double-density storage may be used.

The drive is our Model DDF. It is a companion unit for our compact Model CSO/D computer.

The DDF operates from 110, 120, 220 or 240-volt lines at either 50 or 60 Hz. Forced air cooling is used for low-temperature, reliable operation.

SOFTWARE

Many advanced programs are available from Cromemco on 5-inch disks. These include 32K Structured BASIC, RATFOR, 'C' COBOL, LISP, and others. See section IV of this catalog.

PRICE

Model DDF Dual 5" Drive $1295

See section III for disk controller information.

8" Dual Disk Drive

— Now with quad-capacity for 1.2 megabyte storage on each diskette

8" DUAL DISK DRIVE

Here is a convenient unit to use for cases where you want a large disk memory.

This Model PFD dual drive holds two 8-inch disks which will each hold 1.2 megabytes for a total of 2.4 megabytes for the unit.

Recording is done using a soft-sectored IBM format.

The drive can be used with our Z-2 Computer or any S-100 bus computer using our Z-80 CPU card.

The drive operates from our Model 16FDC Disk Controller.

The drive is complete with power supply and cables to connect to the interface on the Model 16FDC Controller.

The unit is supplied in the oiled wanut case shown here.

SOFTWARE

Software such as our FORTRAN IV and other programs is available on 8" diskettes. See Section IV of this catalog for details.

PRICES

Model PFD 8" Dual Disk Drive Assembled $3695

Joystick console with speaker

EASY TO INPUT IT TO YOUR COMPUTER

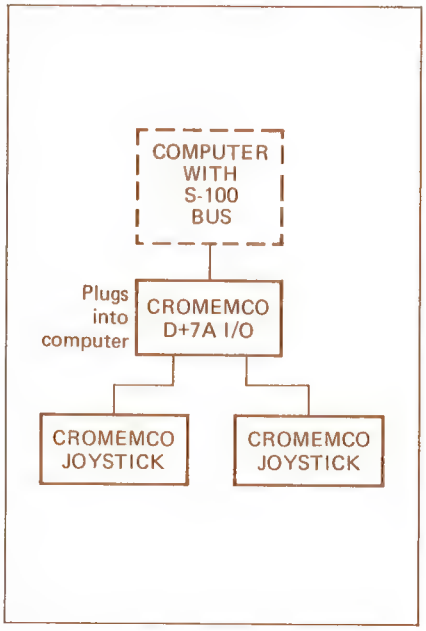
You'll get a lot more use out of your computer with this new joystick.

But note that it is not just an ordinary joystick—it is a *console*. It has a 2-axis joystick *and* contains a *speaker* and *speaker amplifier*. You can have *sound* with your games or, say, warning sounds in other applications. Or have your computer talk to you.

Gives you sound, too

Four pushbuttons

A third feature you get is *four pushbutton switches*. These give you even more possible uses such as selecting various colors on a color graphics terminal.



EASY TO COUPLE

To couple the new joystick to your computer, just use our D+7A™ I/O board. It will couple not only one but *two* consoles. And you'll still have several analog channels left over (and one 8-bit output port).

The D+7A plugs into the Standard 100 (S-100) bus of your computer.

ORDER TODAY

Cromemco wishes you more use from your computer. Get this new joystick console and other Cromemco peripherals at your computer store.

PRICE

Joystick console (each)
(Model JS-1W) $145

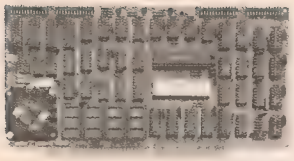
TECHNICAL SPECIFICATIONS
JS-1 Joystick Console

JOYSTICK:
Degrees of freedom: 2 axes (X and Y), spring return to center.
X axis output voltage: ±2 volts, center 0 volts.
Y axis output voltage: ±2 volts, center 0 volts.

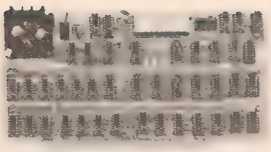
SWITCHES:
Number of switches: 4
Output switch depressed: 0 volts
Output switch open: +5 volts

AMPLIFIER/SPEAKER:
Input voltage range: −2.56 to +2.54 volts
Output: 47-ohm internal speaker

GENERAL INFORMATION
S-100 bus interface: use Cromemco D+7A I/O.
Power requirements: + 5 volts @ 50 mA
+18 volts @ 40 mA
−18 volts @ 40 mA
Operating environment: 0-55°C

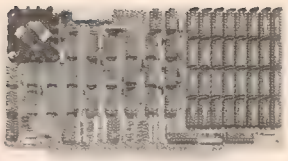


Z-80 Single Card Computer



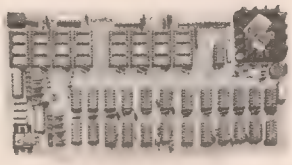
Z-80 CPU card

4K RAM card

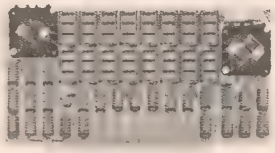


16K RAM card

64K RAM card



8K BYTESAVER PROM card and programmer



16K PROM card

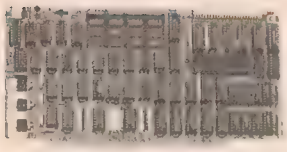
32K BYTESAVER PROM card and programmer

Section III
Computer Cards

Our RAM memory cards can be greatly expanded using our Bank Select feature described in this section.

Cromemco-assembled cards are tested on automatic check-out equipment and thoroughly burned-in in temperature chambers.

Cromemco offers a variety of computer cards including a Z-80-based single card computer, several memory cards including a fast 64-kilobyte memory, our extremely well-known BYTESAVER cards and several powerful interface cards.

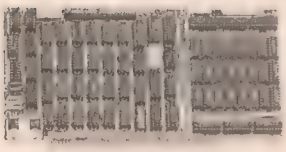


IOP processor

QUADART serial communications interface

16 FDC Disk controller

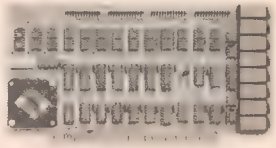
16K Two-port RAM card



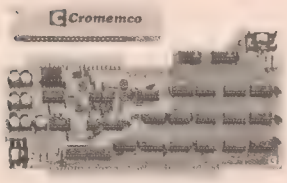
48K Two-port RAM card

Graphics interface

8-port parallel interface card

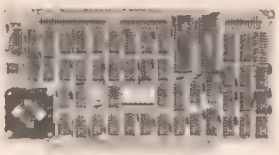


4-port isolated parallel interface card

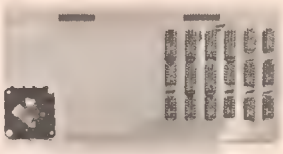


7-channel A/D and D/A card

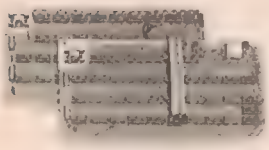
TU-ART I/O interface



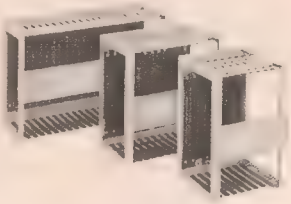
Disk Controller



Printer interface card



TV DAZZLER color graphics interface

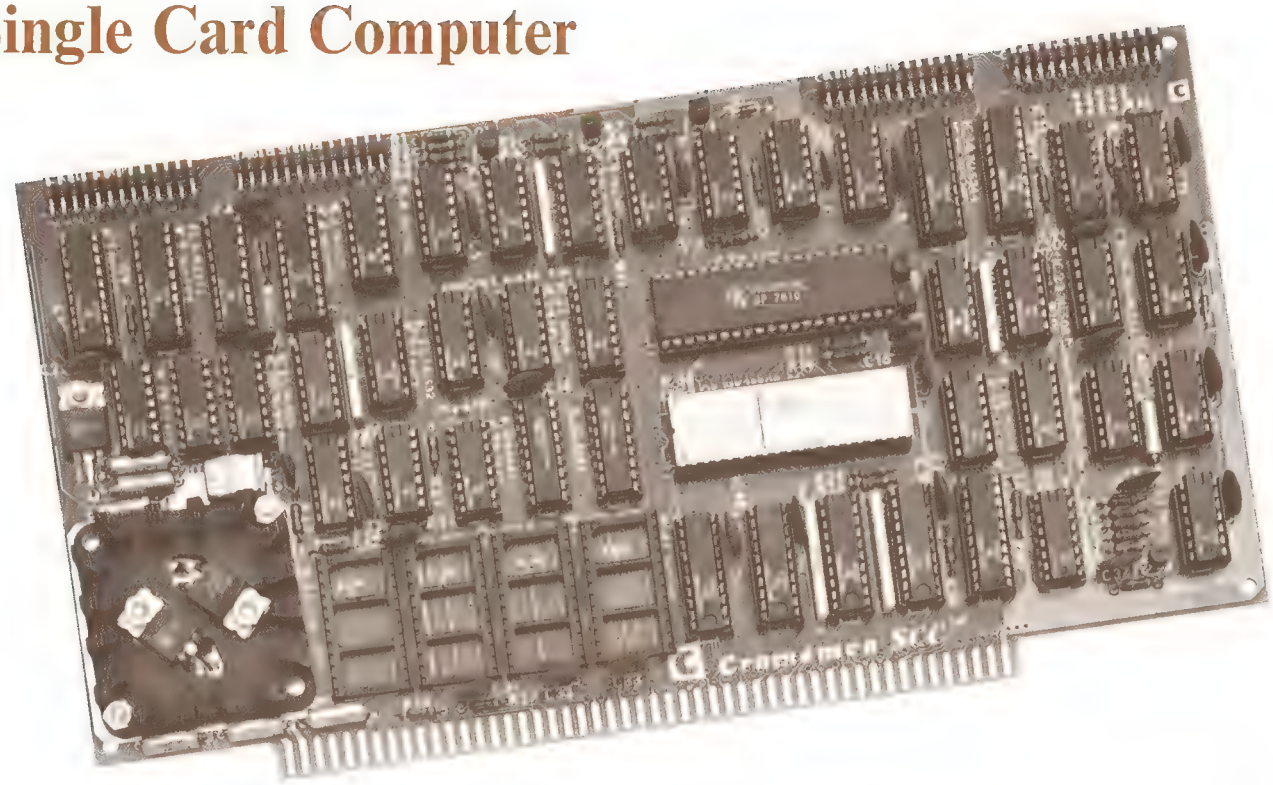


Card Cages

Wire Wrap card

Extender card

4 MHz
Single Card Computer



A COMPLETE 4 MHz COMPUTER

With our new Single Card Computer, Cromemco brings the power of the Z-80 and the flexibility of the S-100 bus to the dedicated computer environment.

This card was designed to get your application up and running fast. Naturally you get a 4 MHz operation. You also get up to 8K bytes of on-board 2716 PROM, and 1K byte of static RAM memory. Interfacing is a snap through the RS-232 (or 20 mA current loop) serial interface with programmable baud rates to 76,800 baud. This stand-alone card also gives you 24 bits of bidirectional parallel I/O, 5 programmable timers, vectored interrupts, and complete compatibility with all Cromemco cards.

Our Single Card is a complete computer. Only a power supply and your PROM software are required for operation. Yet the Single Card can be the core of an enormously expandable S-100 bus system since you can add additional memory, I/O, or even floppy disk drives as your application requires.

MONITOR/3K BASIC

Our well-known Z-80 Monitor and our 3K Control BASIC are available in 2316 ROM for use in your Single Card Computer. With this two-ROM set you are ready to begin using a single Card right away — no other memory or I/O is required. The monitor has 12 commands to aid you in program development. Our Control BASIC has 36 commands/functions and can directly access I/O ports and memory locations as well as call machine language subroutines.

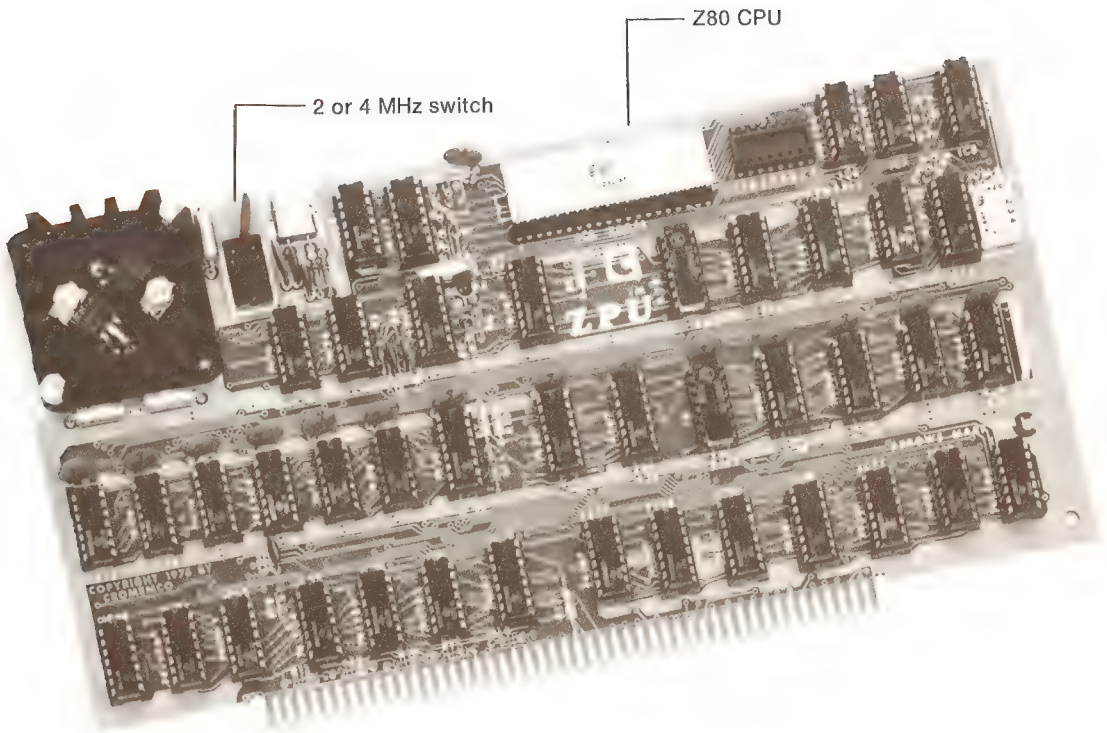
PRICES

Single Card Computer assembled
(Model SCC) $495.00
Monitor and Control BASIC
in two ROMs (Model MCB-216) $90.00

TECHNICAL SPECIFICATIONS
SCC Single Card Computer

Processor: 4 MHz Z-80
Instruction Set: 158 instructions including the 78 instructions of the 8080.
ROM Capacity: 8K Bytes located from address 0000 to 1FFF
ROM Type: Intel 2716 PROM or equivalent
RAM Capacity: 1K Bytes located from address 2000 to 23FF
RAM Type: 4045, Static
Serial I/O Ports:
  I/O levels: RS-232 or 20 mA current loop
  Baud rate: 110 to 76,800 (software selectable)
Parallel Ports:
  Input Port: 24 bits bidirectional
  Output Port: 24 bits bidirectional
  Input Load: One TTL equivalent
  Output Drive: 20 TTL loads
Interval Timers:
  Number of timers: 5
  Timer Range: 0-16.32 milliseconds (software selectable)
  Timer resolution: 64 microseconds
Vectored Interrupts:
  Number of restart locations (Z-80 mode): 65,536
General Information:
  UART type: 5501
  Bus: S-100
  Power requirements: + 8 volts at 1.4 A
  +18 volts at 70 mA
  −18 volts at 25 mA
  Operating environment: 0-55°C

4 MHz CPU card



- Uses special Z-80 microprocessor
- Fast—4 MHz clock rate
- Does not require front panel for operation

2-5X MORE THROUGHPUT

Here is by far the most powerful CPU card now available. (It is the heart of our computer systems.)

It uses the Z-80 chip — in fact, it uses a high-speed version of the Z-80 certified by its manufacturer for 4 MHz operation.

The Z-80 has all the advantages of the 8080 and 6800—and enormously more.

And Cromemco's new Z-80-CPU card does enormously more.

4 MHz CLOCK RATE

First, this CPU lets you choose either a 2 or 4 MHz crystal-controlled clock rate. Right away that means you can have twice the throughput. Cuts program running time in half. Then the instruction set of the Z-80 reduces software even more.

The 2 or 4 MHz clock rate is switch-selectable as shown in the above photo.

POWER-ON MEMORY JUMPS

Cromemco's CPU also has some neat design innovations of its own.

For example, you'll like the simplified operation you get because upon power turn-on the CPU will jump to any desired 4K boundary in memory. No switch flipping to go through to begin your program. So you can also use this CPU card in stand-alone systems — and it can be operated without need of a front panel.

80 ADDITIONAL INSTRUCTIONS

You've probably heard that the Z-80 with its 80 new additional instructions is by far the most powerful chip around. It's true.

That means with our CPU you will be able to devise much more powerful (as well as faster) software than before.

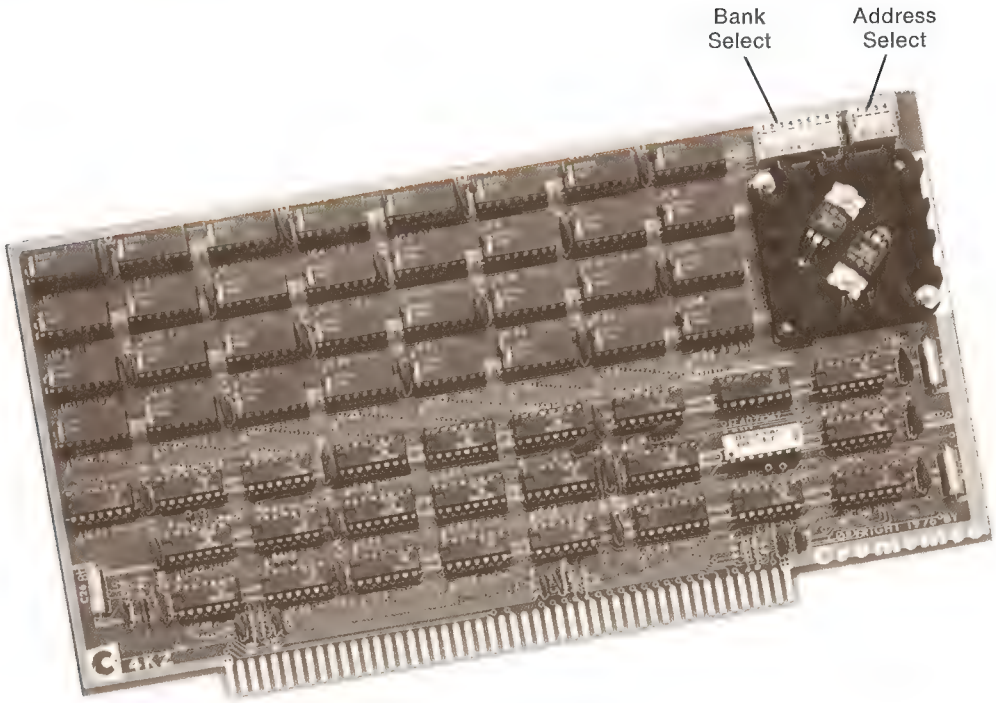
PRICE

Z-80-CPU assembled
(Model ZPU) $395

TECHNICAL SPECIFICATIONS
Z-80 Microprocessor Card

Processor: 4 MHz version of the Z-80.
Clock rate: 2/4 MHz (switch selectable)
Instruction set: 158 instructions including the 78 instructions of the 8080.
Power-on jump: jumper wire enabled.
Power-on jump locations: 16 locations switch selectable.
Wait State generation: 0-4 wait states jumper wire selectable.
M1 Wait State: Jumper wire selectable.
BUS: S-100.
Power requirements: +8 volts @ 1.1 A.
Operating environment: 0-55°C.

4K RAM card with address anticipation and Bank Select



See information about Memory Bank Select in this section

- 4 MHz speed
- Memory Bank Select feature

As you would expect with a Cromemco product, our Model 4KZ gives you advanced performance at low cost.

It achieves its 4 MHz speed while using proven, reliable, low-power memory chips (21L02s) in a novel design involving address anticipation.

EXPANDABILITY

You get an unusual degree of expandability in the Model 4KZ — to 512 kilobytes if you'd like.

To achieve this, the 4KZ is arranged so you can organize memory into as many as 8 banks of 64K bytes each.

Then an 8-position switch on the card selects a given bank.

With memory expandability like that, Cromemco's CPU and RAM cards are the basic hardware for a broad range of jobs — even jobs that until now were only for large computers.

LOW PRICED

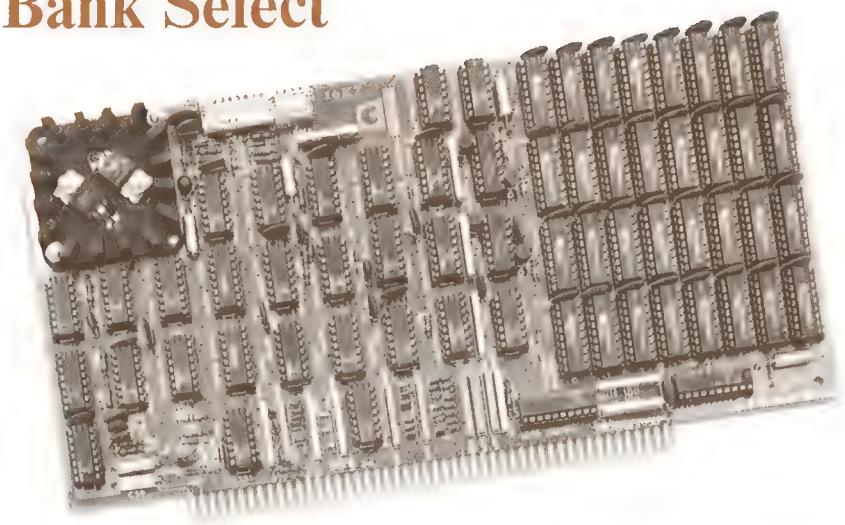
The Model 4KZ has the quality Cromemco is known for. Get it at your computer store.

4K Static RAM Memory assembled, burned-in and tested (Model 4KZ) $295

TECHNICAL SPECIFICATIONS
Model 4KZ RAM Card

Memory capacity: 4K bytes.
Memory type: 21L02 RAM.
Memory access time: 450 nanoseconds
Wait States at 2 MHz: none required.
Wait States at 4 MHz: on non-sequential addresses only.
BUS: S-100.
Power requirements: +8 volts @ 0.8 A.
Operating environment: 0-55°C.

16K RAM card with Bank Select



- The fastest available
- No wait states required at either 2 or 4 MHz operation
- Offers expandability to a half megabyte with Bank Select
- Can be used for time-sharing
- Dynamic refresh fully transparent

FAST, EXPANDABLE

Not only is this the fastest 16K RAM card available but it is expandable to a half megabyte.

It will operate at 4 MHz *with no wait states.*

TIME SHARING

One of the best examples of the power of the Bank-Select feature is that it will let you achieve a time-share system with minimum software overhead.

Each user (there can be up to 7) will be confined to his own bank of memory.

S-100 BUS COMPATIBILITY

This memory can be plugged into any S-100 bus computer. That includes the entire family of Cromemco computer systems.

START WITH THE BEST

Sooner or later you'll inevitably want larger memory. So start with Cromemco and be sure you'll have the expandability and high-speed performance you'll need.

PRICES

16K RAM Memory assembled, burned-in and tested (Model 16KZ) $495

TECHNICAL SPECIFICATIONS
Model 16KZ RAM Card

Memory capacity: 16K bytes.
Memory type: 4050-2 RAM.
Memory access time: 200 nanoseconds.
Wait States at 2 MHz: none required.
Wait States at 4 MHz: none required.
BUS: S-100.
Power requirements: + 8 volts @ 0.8 A
+18 volts @ 0.5 A
−18 volts @ 10 mA
Operating environment: 0-55°C.

MEMORY BANK SELECT

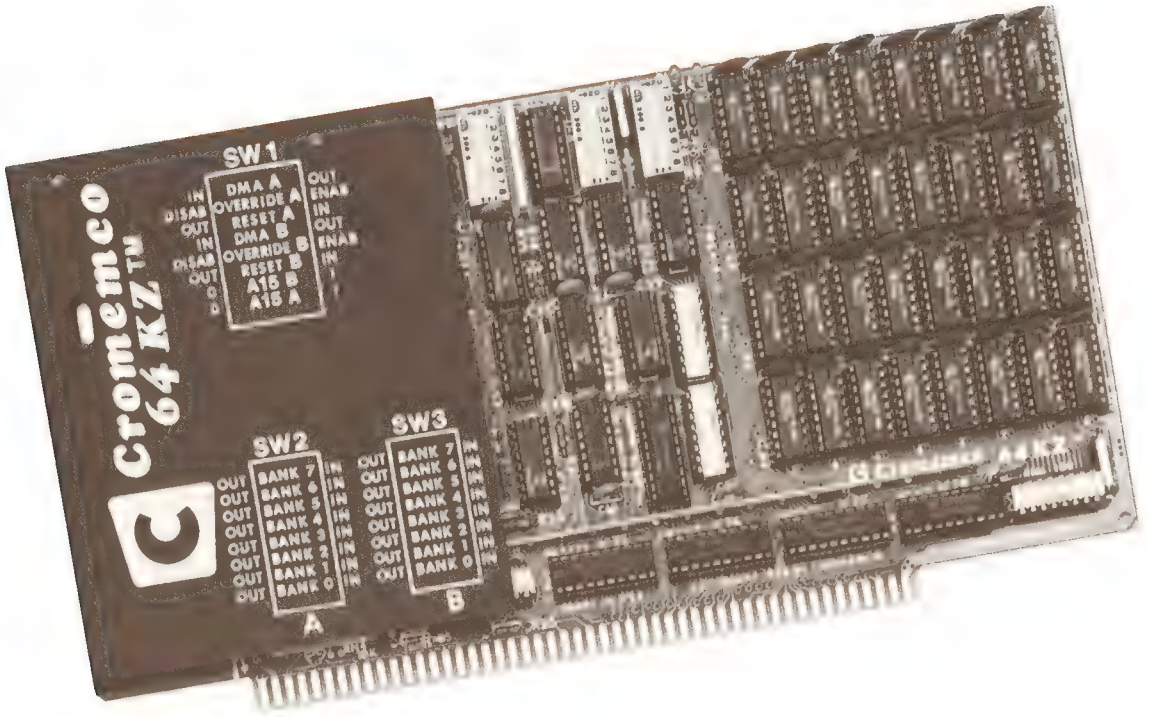
Memory bank select is a feature incorporated on Cromemco memory boards that allows the expansion of memory-space beyond 64K bytes. With bank select, memory space may be organized into 8 banks of 64K bytes each for a total of one-half megabyte memory.

With bank select each memory board may reside in one or more of the 8 possible memory banks. An 8-position DIP switch on the board is used to select each of the banks in which the board resides.

The active bank or banks of memory are selected under software control. Output port 40H is dedicated to this function. Each of the 8 bits of data of output port 40H is used to turn on or off the corresponding bank of memory. A "1" in the corresponding bit position will turn on the memory bank. A "0" will turn it off. All circuitry required to detect the output of port 40H is included on the memory card itself.

Bank select provides a convenient method by which to expand system memory space beyond 64K. Bank select also permits the implementation of time-sharing systems with a minimum of software overhead — up to 7 users can use the system simultaneously with each confined to his own bank of memory.

64K RAM card with Extended Bank Select



- Enormously expandable
- Guaranteed 4 MHz operation from 0-55°C
- Low power

This new 64-kilobyte RAM card is fast and tremendously expandable in keeping with Cromemco's objective of providing you with obsolescence insurance.

The Model 64KZ is organized as two 32K blocks of memory. Each block can be placed either in high-memory space (address 8000-FFFF) or low-memory space (address 0000-7FFF).

Each block can further be placed in any of 8 different memory banks. Address and bank assignment of each 32K block is switch selectable.

Another feature is that each 32K block can be independently switched to be selected or de-selected after reset.

ENORMOUSLY EXPANDABLE

With our Bank Select feature you can expand memory space from 64K to 512K in eight banks.

Now with the Extended Bank Select feature in this new card you can expand to as much as 16 megabytes.

The 64KZ is fully tested to be compatible with all Cromemco products.

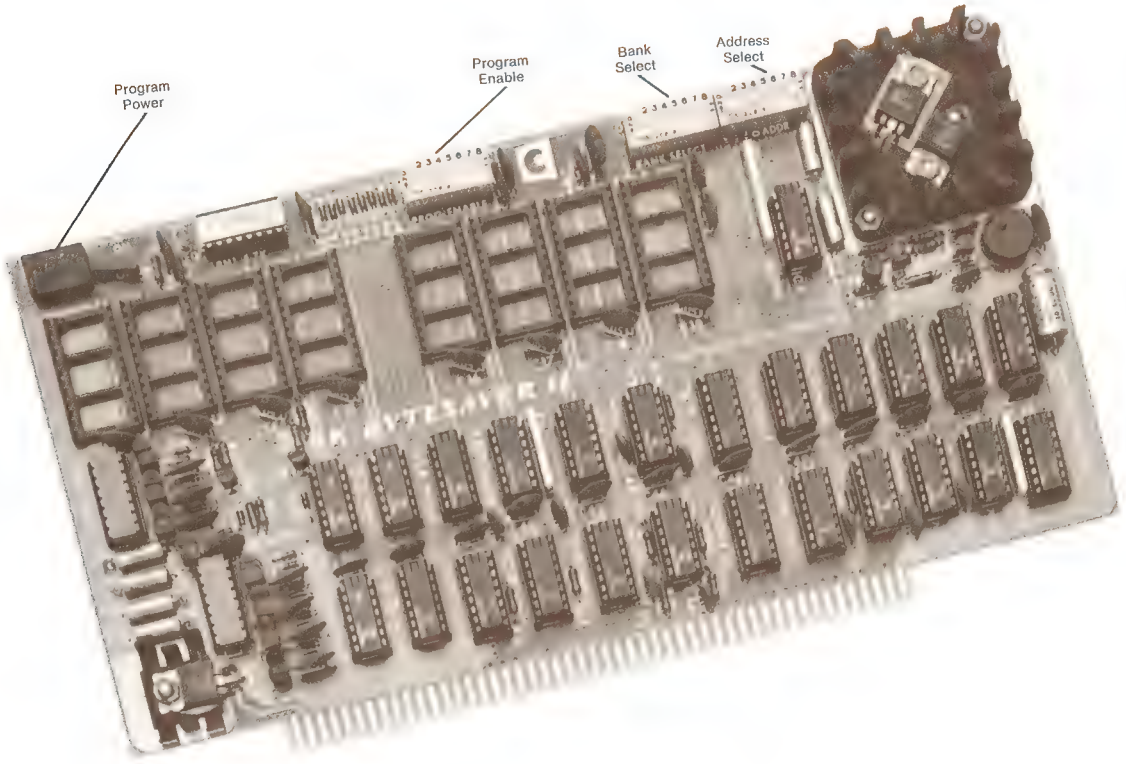
PRICE

64KZ High-Speed RAM Memory; factory assembled, burned-in and tested (Model 64KZ) $1495

TECHNICAL SPECIFICATIONS
Model 64KZ RAM Card

Memory capacity: 64K bytes.
Memory type: 4116
Memory access time: 150 nanoseconds.
Wait States at 2 MHz: none required
Wait States at 4 MHz: none required.
BUS: S-100.
Power requirements: + 8 volts @ 1.5 A
+18 volts @ 0.2 A
Operating environment: 0-55°C

8K BYTESAVER II memory board with 2708 PROM programmer



You're probably well acquainted with Cromemco's original BYTESAVER since it is the industry-standard PROM board on the S-100 bus.

Now this new BYTESAVER II gives you even more features. As with the original BYTESAVER, you get these two important features:

(1) A simple, easy way to store your programs in 2708 programmable read only memory (PROMs)).

(2) A PROM board with the capacity for a full 8K bytes of PROM memory storage.

Here are the features the new BYTESAVER II gives you:

(1) Convenient switch selection of board address.

(2) Memory bank selection.

(3) Fully buffered address lines.

(4) Digitally timed programming pulses

(5) Individual program enable switches for each of the eight PROM positions.

PROM PROGRAMMER

Many people are surprised to learn that in the BYTESAVER II you also have your own PROM programmer. But it's so.

And it can save you hundreds of dollars since you no longer need to buy one separately.

The built-in programmer is designed for the popular 2708 PROM. Each 2708 holds a full 1K bytes of memory. And the 2708 is UV erasable so that it can be used again and again. A 2708 PROM can be programmed in any of the 8 sockets on the BYTESAVER II. Individual program enable switches assure that PROMs not selected for programming cannot be accidentally programmed.

RESIDES IN MEMORY

Note that the BYTESAVER II card resides in 8K of memory. PROMs are programmed using conventional memory write instructions. To further simplify PROM programming, several Cromemco software packages contain special "Program" commands to transfer code from RAM memory into the BYTESAVER II PROM memory. These program commands are found in our Z-80 Monitor (ZM-108), Control BASIC (CB-308), ROS (ZA-808), and DEBUG in our disk assembler packages (FDA-S/L).

Once your program is written into BYTESAVER II PROMs, it's protected from power turn-offs, intentional or accidental. And since the BYTESAVER II resides in memory, PROM resident programs can be directly executed from this card.

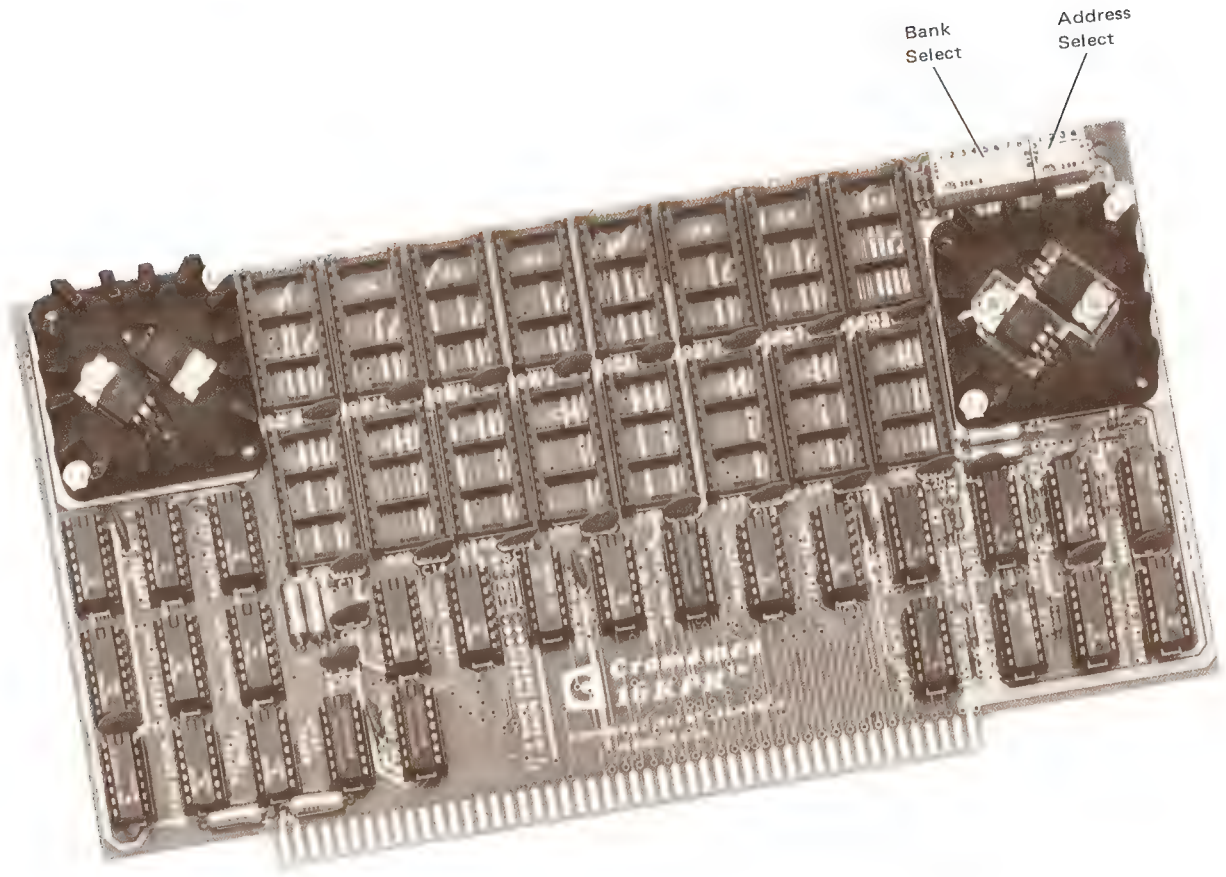
PRICE

BYTESAVER II assembled, burned in and tested (Model 8KBS) $295

TECHNICAL SPECIFICATIONS BYTESAVER II Model 8KBS

Memory capacity: 8K bytes.
Memory type: 2708 PROM or equivalent.
Memory access time: 450 nanoseconds.
Wait States at 2 MHz: none required.
Wait States at 4 MHz: one per machine cycle.
BUS: S-100.
Power requirements:
+ 8 volts @ 0.8 A
+18 volts @ 0.4 A
−18 volts @ 0.2 A
Operating environment:
0-55°C

16K PROM card with address anticipation and Bank Select



HOLDS UP TO 16 HIGH-SPEED, ERASABLE 2708 PROMs

Here's what you need when you want the capability for a sizable PROM memory.

The 16KPR holds up to 16 type 2708 or equivalent PROMs. (You can program these with the BYTESAVER.

BANK SELECT

And the 16KPR has our bank-select feature. That lets the board be part of large memory systems of up to 8 banks of 64K each. See additional information on p. 25.

FAST

The 16KPR will operate with the fastest microcomputers because of its address anticipated feature. This means that there are no wait states required in the usual sequential addressing type of operation.

See information about Memory Bank Select in this section

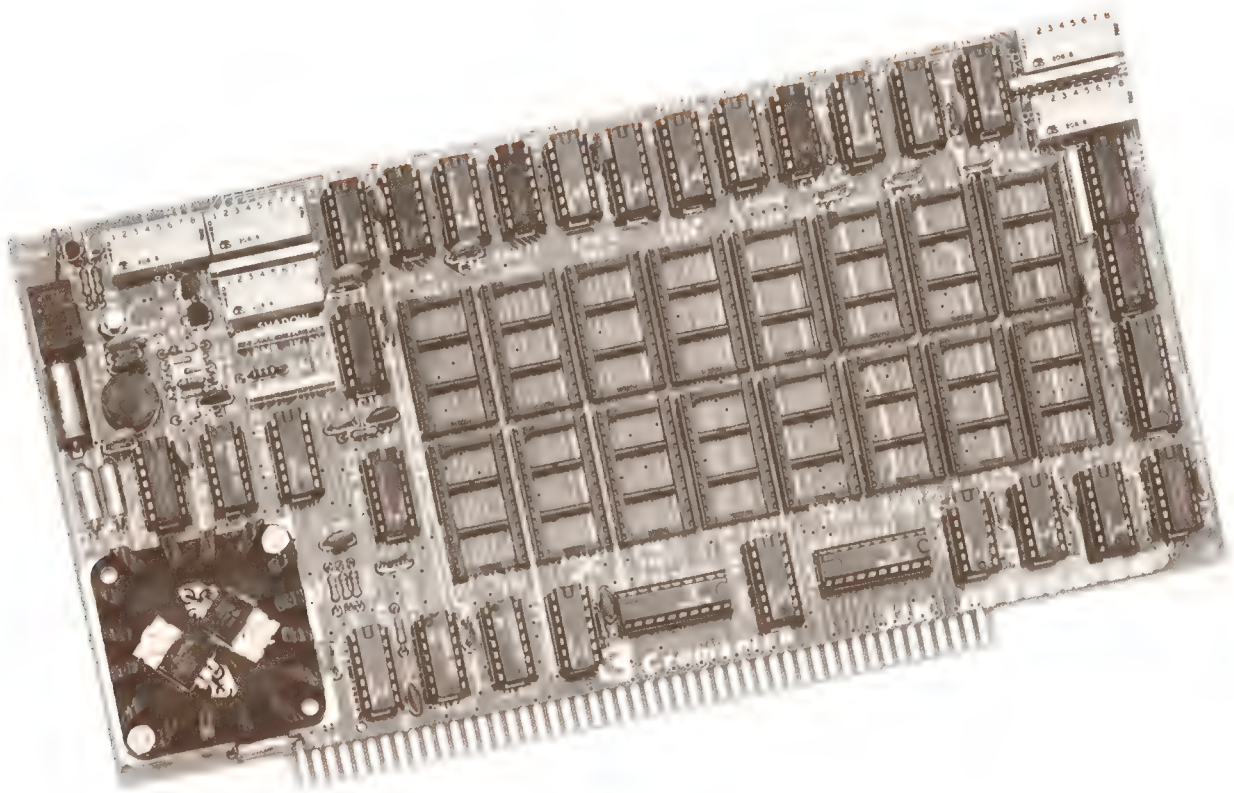
PRICES

16K PROM card assembled, burned in, and tested (Model 16KPR) $245

TECHNICAL SPECIFICATIONS
Model 16KPR PROM Card

Memory capacity: 16K bytes.
Memory type: 2708 PROM or equivalent.
Memory access time: 450 nanoseconds.
Wait States at 2 MHz: none required.
Wait States at 4 MHz: on non-sequential addresses only.
BUS: S-100.
Power requirements: + 8 volts @ 0.4 A
+18 volts @ 0.8 A
−18 volts @ 0.5 A
Operating environment: 0-55°C

32K BYTESAVER® memory board with 2716 PROM programmer



32K BYTESAVER® PROGRAMS THE NEW, HIGH DENSITY 2716 PROM

Many customers have asked for a card that has the ease of use and high flexibility of our popular BYTESAVER® 2708 PROM card but one that could use the new 2716 2-kilobyte PROM.

Now Cromemco's 32K BYTESAVER® card gives you a full 32-kilobyte capacity of non-volatile storage for those ROM-intensive applications.

You also get the convenience of an on-board 2716 programmer.

The new 32K BYTESAVER® holds up to 16 of the 2716 PROMs. Switches are provided to: (1) protect and un-protect PROMs individually or in groups for programming (2) shadow ROM socket pairs (allows external RAM to overlap portions of ROM address space) (3) select card address, and (4) control the powerful Bank-Select and DMA IN-OUT features.

NO SPECIAL SOFTWARE NEEDED

A simple, one-time write of the desired data into an erased PROM with the on-board programmer turned on is all that is required to store information quickly and permanently.

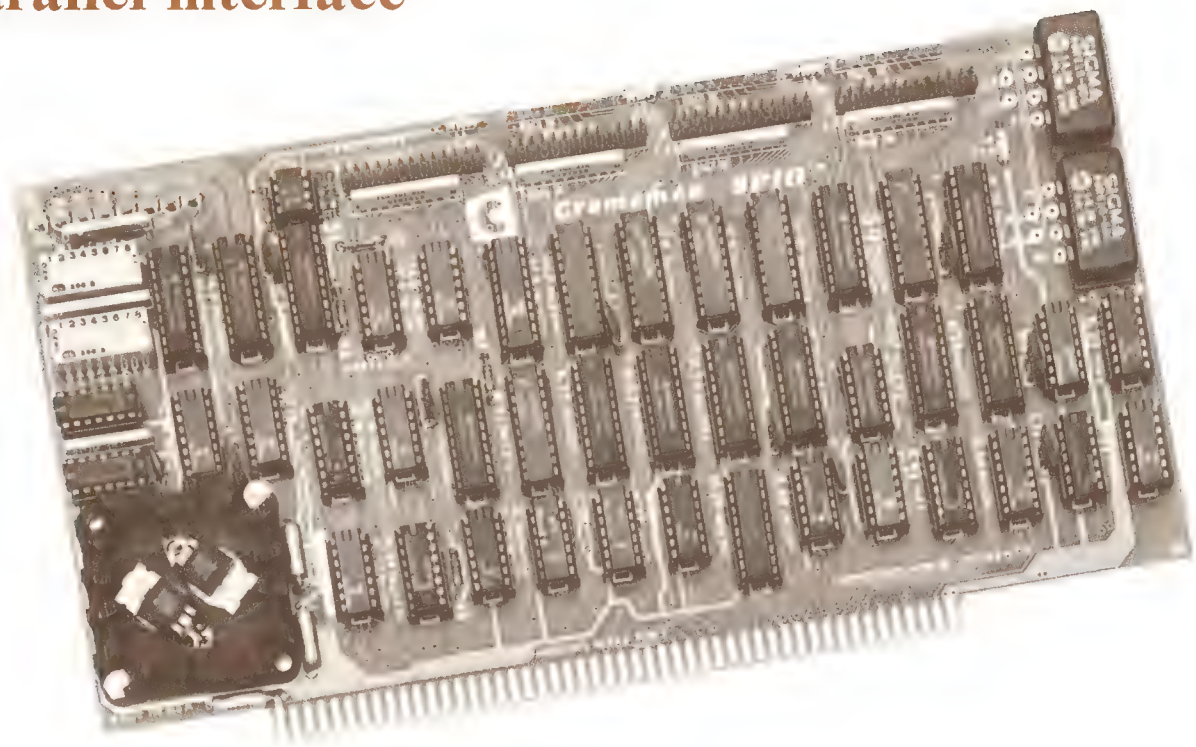
PRICE

32K BYTESAVER® PROM card assembled, burned in and tested (Model 32KBS) $345

TECHNICAL SPECIFICATIONS 32K BYTESAVER® PROM Card Model 32KBS

Memory capacity: 32K bytes.
Memory type: Intel 2716 PROM or equivalent.
Memory access time: 450 nanoseconds.
Wait States at 2 MHz: none required.
Wait States at 4 MHz: one per machine cycle.
BUS: S-100.
Power requirements: +8 volts @ 2.1 A, max.
Operating environment: 0-55°C.

8 Port I/O Multi-channel microcomputer parallel interface



SIMPLIFIED PARALLEL INTERFACING

Parallel interfacing was never easier than with the Cromemco 8PI/O Parallel Interface Card.

You get 8 bidirectional 8-bit I/O ports that can be used either singly or coupled together to form longer word lengths.

For convenience, input and output status flags for handshake purposes are grouped together on one port and may be accessed with one input or output statement.

Strobe pulses can be issued after each 8-bit transfer or may be delayed until the proper word length has been formed.

Other features include 8 sense switches and 8 LEDs on the highest selected I/O port on the card, and 2 bits of opto-isolated input and 2 bits of relay-driven output.

The 8 I/O ports may be located on any 8-port I/O boundary.

PRICE

8PI/O assembled (Model 8PIO) $295

TECHNICAL SPECIFICATIONS
Model 8PI/O
8-Channel Parallel Interface

Parallel I/O Ports:
- **Number of bidirectional ports:** 8
- **I/O port width:** 8 bits wide.
- **Input load:** 4 TTL loads.
- **Output drive:** 4 TTL loads.

Input strobes: latched.

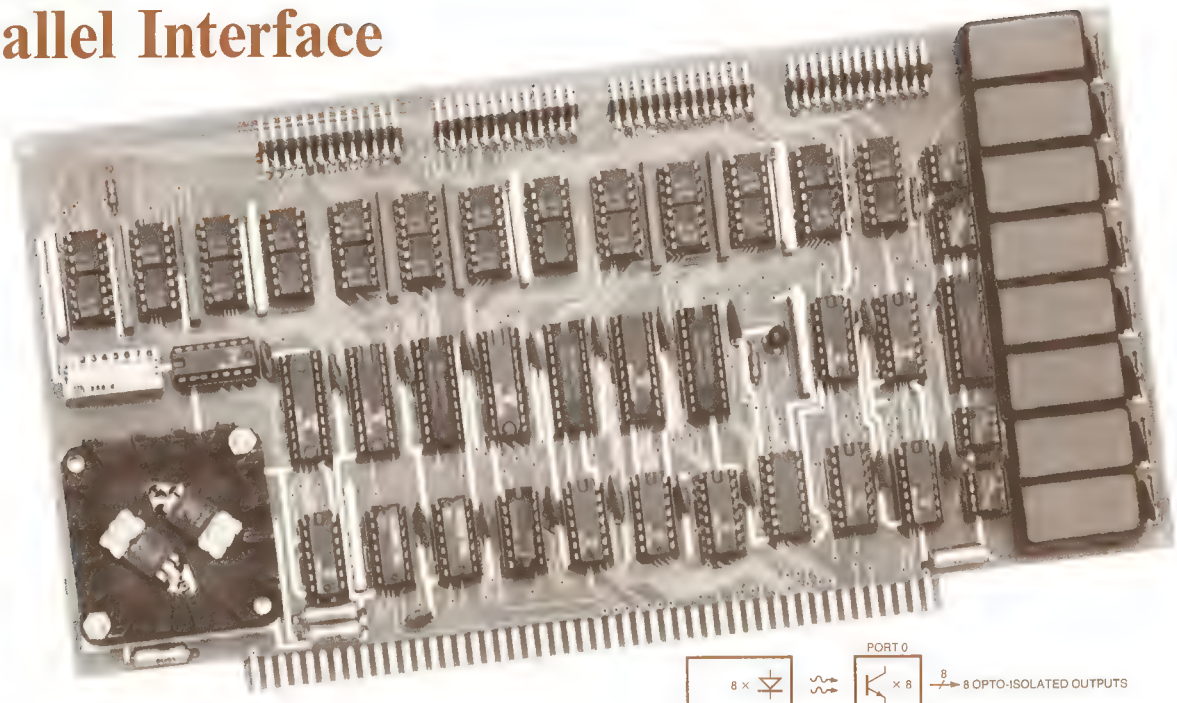
Output strobes:
- **Delay:** 1 μsec after new data valid.
- **Width:** 1.5 μsec; negative true.
  1 strobe pulse per port.

Opto-Isolator input:
- **Number of Opto inputs:** 2 bits,
  TTL level inputs.

Relay Outputs:
- **Number of relay outputs:** 2 bits.
- **Contact voltage:** 28 V AC or DC.
- **Contact current:** 1 amp.
- **Contact type:** SPDT.

General information:
- **BUS:** S-100.
- **Power requirements:** +8 volts @ 1.5 A
- **Operating environment:** 0-55°C.

4 Port I/O Isolated Parallel Interface



- Complete electrical isolation
- Eliminates ground loop problems

Now your interfacing can be achieved with complete electrical isolation from your microcomputer.

Electrical isolation means that problems with ground noise and ground loops can be completely eliminated in your instrumentation, communications, or process control systems.

Electrical isolation also means that potentially damaging transients can be safely isolated from your computer system.

The new Cromemco 4PIO parallel interface card includes:

24 opto-isolated input channels
16 opto-isolated output channels
8 relay-isolated output channels
11 opto-isolated strobe/handshake lines
1 opto-isolated reset line

The 4PIO services these isolated I/O channels through four parallel, 8-bit I/O ports. The addresses of these I/O ports are switch selectable (in blocks of four) by means of a switch located conveniently on the 4PIO interface card.

ISOLATED CONNECTOR PINS

The isolated I/O channels of the 4PIO are brought to four connectors on the top edge of the card. NO PIN ON ANY OF THESE CONNECTORS IS DIRECTLY CONNECTED TO THE COMPUTER

TECHNICAL SPECIFICATIONS
Model 4PIO Isolated Parallel Interface

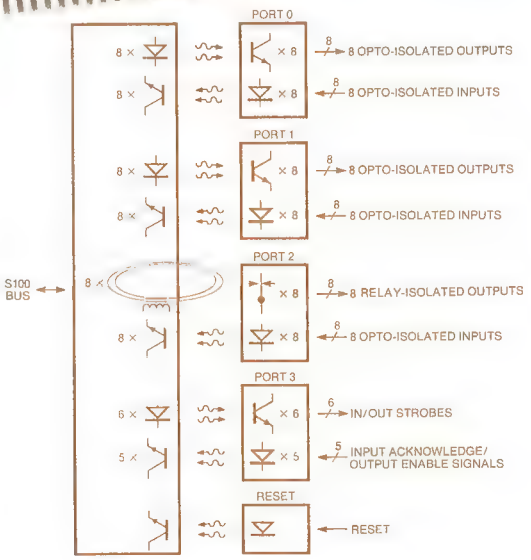
Parallel I/O ports:
Number of bidirectional ports: 4
I/O port width: 8 bits wide.
Number of opto-isolated input ports: 3
Number of opto-isolated output ports: 2
Number of relay-isolated output ports: 1

I/O strobe signals and reset:
Number of I/O strobe bits: 11
Strobe signal isolation: opto-isolated
Reset line: opto-isolated

Opto-isolated I/O:
Number of opto-isolators: 52
Opto-isolator type: MCT66
Signal levels: TTL

Relay outputs:
Number of relay outputs: 8
Contact type: SPDT
Contact voltage: 28 V AC or DC
Contact current: 1 A

General information:
BUS: S-100
Power requirements: +8 volts @ 2.3 A
Operating environment: 0-55°C



Cromemco 4PIO interface. Note that all lines are either optically or magnetically isolated from the computer circuitry.

CIRCUITRY. Every active pin is electrically isolated either by means of an opto-isolator or relay.

Cables are available in two convenient lengths to couple from these top connectors to a standard DB-25S socket. Cable model CBL-2 is 62 cm in length and can be used in our Z-2 computer. Cable model CBL-3 is 110 cm in length for use in our System Three computer.

Like all Cromemco cards, the 4PIO is designed to meet the most demanding standards of industrial performance.

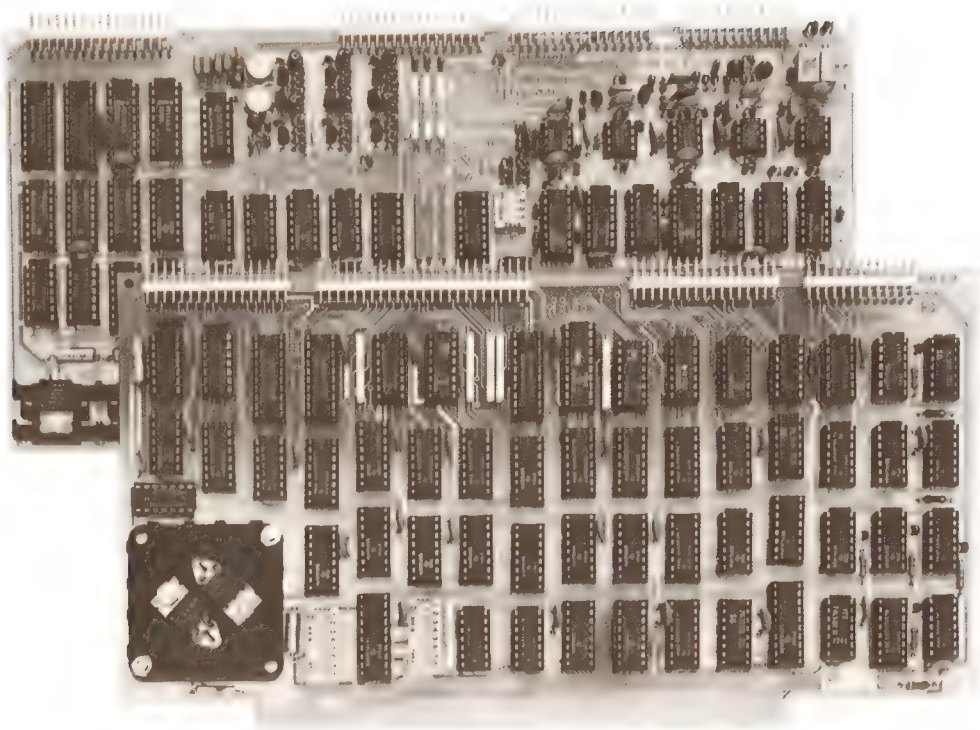
PRICES

4PIO assembled, burned-in and tested
(Model 4PIO) $395

CABLES

CBL-1 (15 cm long) $25
CBL-2 (62 cm long) $25
CBL-3 (110 cm long) $25

Model SDI
Color Graphics Interface

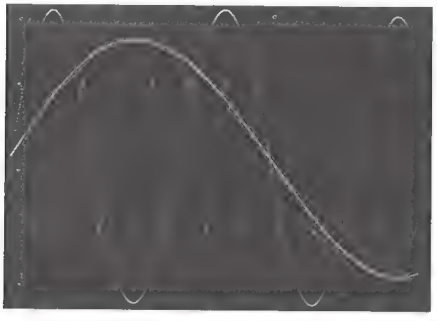


Here's a graphics interface that gives you high resolution, simplicity and an enormous range of color choices unmatched in the industry.

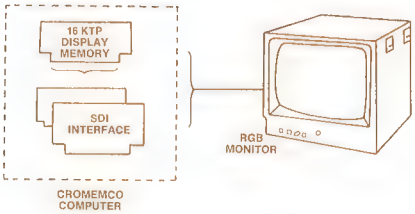
The new Cromemco Model SDI Color Graphics interface is a fully-integrated way to display the memory content of Cromemco computer systems in beautiful and meaningful color choices. Use of color and the high resolution of the image facilitate reading the display by researchers in the field. To simplify examination or discussion, various parts of the scan can be displayed in any of a wide range of colors — 4096 to be specific.

The interface consists of two circuit cards that plug directly into any Cromemco computer. No alteration of the computer is required. All necessary outputs to the monitor are provided by the interface.

The display device is typically an RGB Monitor, used in the industry or available from Cromemco (Model RGB-13).



Very high resolution provided by the new color graphics interface is apparent in this plot of sinusoids.



HIGH RESOLUTION

The new SDI interface can be used to display images with up to 754 x 482-point resolution. As discussed later, this resolution is at least the equal of a high-quality broadcast-TV picture.

COLOR OR B/W

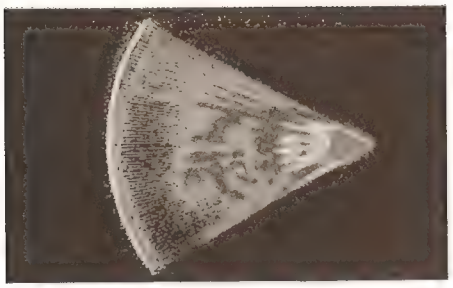
The new interface can be used to display an image in either color or black-and-white — or in both simultaneously.

In color any 16 colors from a palette of 4096 colors can be used in the picture. In black-and-white any 16 shades of gray can be used.

HOW THE SDI MAPS

The SDI uses direct memory access to display the content of a display memory. Each pixel of the display may be mapped either from one nybble (4 bits) or one bit of the display memory. The mapping mode (nybble or bit) is software-selectable — in fact, part of a picture may be displayed in one mode and part in the other.

The display memory may consist of either a 12K or 48K memory.



Display of cross section of human heart imaged by a 2.25 MHz ultrasonic sector scan through body's intra-costal space. The image is displayed using the new SDI interface on an RGB Monitor. This medical application involving the new interface was done at Stanford University.

The combination of mapping modes and memory result in four basic modes of operation as shown below.

MODEL SDI RESOLUTION (HORIZONTAL x VERTICAL) IN EACH OF FOUR MODES OF OPERATION.

	Display Memory Size	
	12K	48K
Nybble-Mapped	189x121	378x242
Bit-Mapped	377x241	754x482

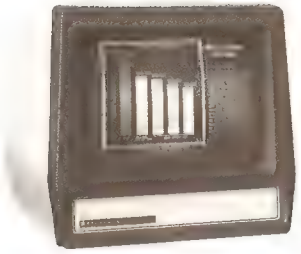
SDI OUTPUTS

The Model SDI provides three separate analog output signals to drive the Red, Green, and Blue guns of a high-quality RGB monitor. The three separate outputs, rather than one composite output, are used to preserve the full resolution of the picture.

In nybble mapped operations each 4-bit nybble can select one of 4096 colors as determined by a mapping RAM. The contents of the mapping RAM can be changed dynamically, under software control, by issuing OUTPUT instructions to the SDI.

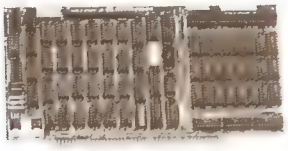
TV COMPATIBILITY

The Model SDI also provides all signals required to serve as input to a colorizer or color modulator in a TV broadcast studio.



RGB MONITOR

New Cromemco RGB (red/green/blue) Color Monitor is specially adapted for use with SDI Interface. Photos shown herein are from this monitor.



48K DISPLAY MEMORY

A new 48K two-port memory card has been developed for use with the SDI. Picture information is accessible by the SDI through a connector on the top of the memory cards. The cards plug directly into the Cromemco computer.

The computer resident memory may also be used as the display memory, although at the expense of mapping speed. This reduction occurs because the CPU must suspend operation when the SDI accesses the resident memory. The result is approximately 55% CPU utilization for a 12K-memory picture and 6% utilization for a 48K-memory picture.

Use of the special two-port memory, however, assures 75% to 100% CPU utilization, depending on the application software.

DESIGNED TO SURPASS TV QUALITY FOR LONG-TERM APPLICATION

In its high-resolution mode, the SDI* displays a picture having a 754 x 482-pixel resolution. This format corresponds to and is compatible with NTSC TV systems practice in that 482 lines are normally displayed in a nominal 525-line system. The 754 points in the horizontal direction give a resolution equal or better than that of the vertical direction.

The horizontal resolution itself far exceeds that of conventional TV displays which have relatively limited bandwidth.

The result of the above approach is that the high-resolution picture displayed using the SDI interface is at least equal in resolution to a 525-line color TV picture.

*U.S. Patent No. 4121283

TECHNICAL SPECIFICATIONS

Model SDI
Color Graphics Interface

Mapping modes: Bit or nybble; software selected.
Resolution: 754 x 482 pixels maximum using 48K display memory. 12K display memory may also be used at lower resolution; see text.
Color: Any 16 of 4096 colors or any 16 shades of gray may be displayed.
Outputs: Three analog outputs for R.G.B. monitor.
Recommended Display Memory: Cromemco 48KTP two-port memory.
Sync signal: Composite Sync signal is switch-selectable. Separate RS-170 Sync signal available.
System Bus: Industry Standard S-100.
Operating Environment: 0-55°C.
Price: $795.

Model 48 KTP
Two-Port Memory

Memory Capacity: 48K bytes
Bus: Industry Standard S-100
Operating Environment: 0-55°C
Price: $1495.

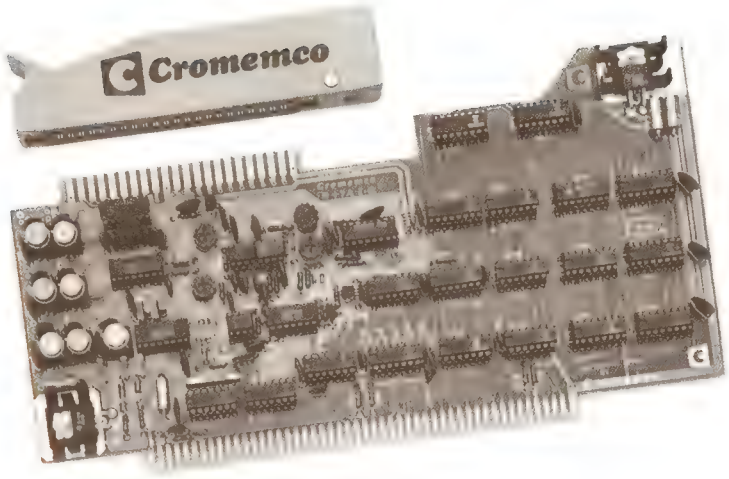
Model RGB-13 Color Monitor

Max. effective screen size: 255 mm x 190 mm
Technology: All solid state except for CRT.
CRT: 13" shadow mask, delta gun
Video signal input: RGB 0.3 - 2.0 v., 75 ohm. Fully compatible with Cromemco model SDI interface outputs.
Video amplifier bandwidth: 50 Hz to 15 MHz ± 3db
Power requirements: 120 or 220 volts, 50/60 Hz.
Power consumption: 250 VA
Dimensions: 18" x 15¼" x 14¾"
Weight: 23 Kg
Operating Environment: –5° to 40°C
Price: $2995

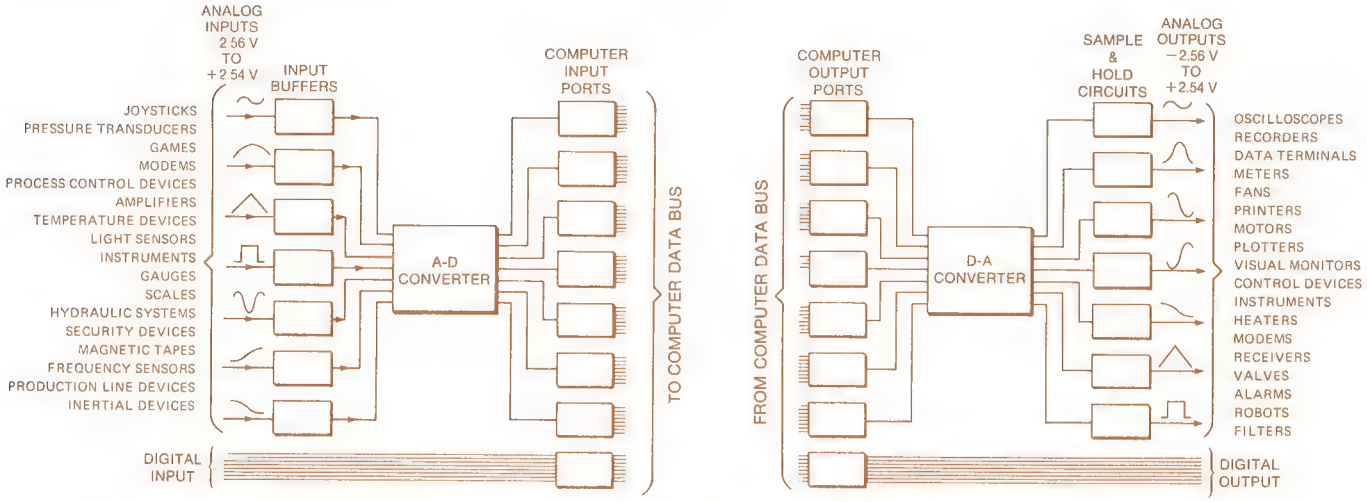
Model 16KTP
Two-Port Memory

Memory Capacity: 16K bytes
Bus: Industry standard S-100
Operating environment: 0-55°C
Price: $795.

D+7AI/O™ Multi-channel microcomputer analog interface



See p. 20 for special joystick console with audio output. Use with this analog I/O.



Now you have a way to get analog information into and out of your microcomputer. It's an easy, fast, and unbelievably inexpensive way.

It's Cromemco's new D+7A® high-performance I/O module which gives you:

- 7 channels of 8-bit analog-to-digital conversions (to input analog data to the computer)
- 7 channels of digital-to-analog conversion (to output computer data in analog form)
- an 8-bit parallel I/O port to input and output data in digital form.
- a fast conversion time of 5.5 microseconds.

A MULTITUDE OF USES

The D+7A makes it easy to use your computer for the jobs you want it do — such as process control, digital filtering, games, oscilloscope graphics, speech recognition, speech and music synthesis.

The D+7A lets you input and output analog data with all sorts of devices: joysticks, ham radio gear, measurement instruments, machine tools, transducers, control systems, motors, recorders, and plotters, to name just a few.

NO FURTHER SOFTWARE NEEDED

The D+7A I/O plugs directly into the Cromemco microcomputers. Analog signal range is from — 2.56 to + 2.54 volts (20-millivolt increments) on both input and output sides.

Simple "Input" and "Output" instructions initiate A/D conversion and read in or out the ensuing 8 bits of data. No further software is required. During conversion the D+7A holds down the computer "Ready" line.

LOW-PRICED

D+7A I/O assembled, burned-in and tested
(Model D+7A) $295

Each D+7A includes a connector to connect to the 8 input and 8 output ports.

TECHNICAL SPECIFICATIONS
D+7A A/D & D/A Interface

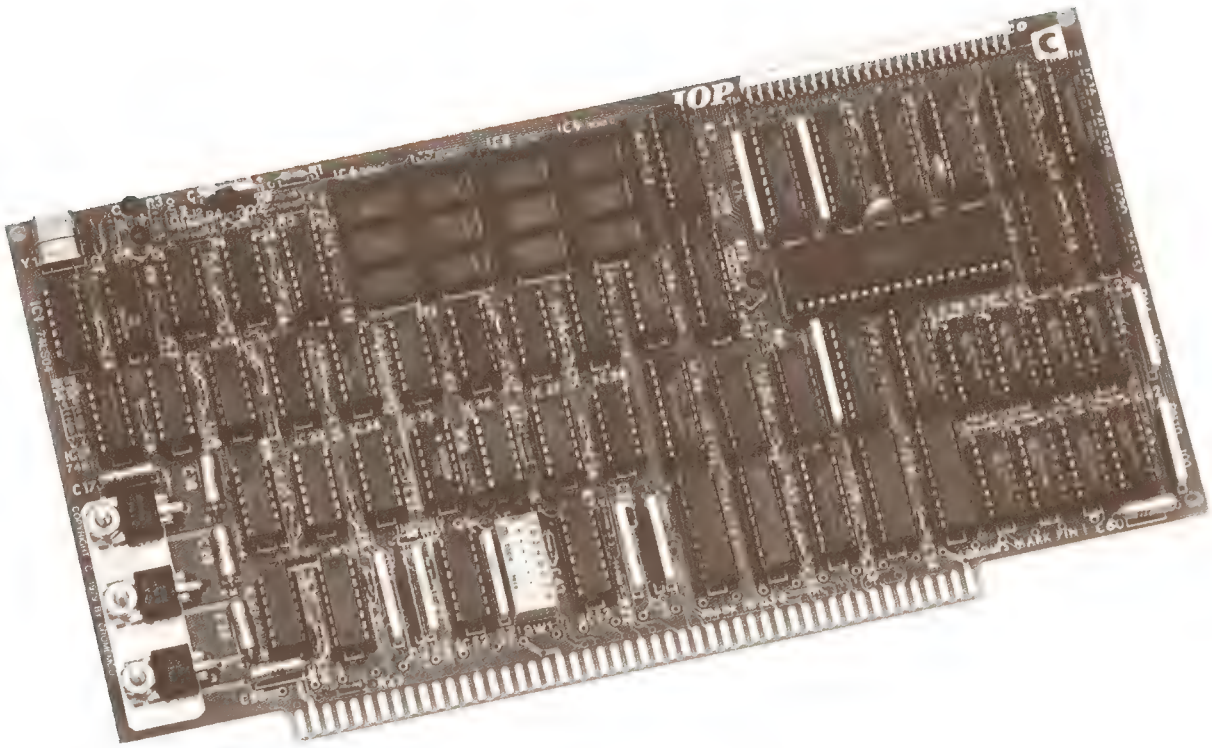
Analog input ports:
- **Number of input ports:** 7
- **Input voltage range:** −2.56 to +2.54 volts
- **Input bias current:** 2 microamps max.
- **Input impedance:** 20 Megohms || .001 μF, 1 KHz sample rate. 2 Megohms || .001 μF, 10 kHz sample rate.
- **Resolution:** 8 bits.
- **Conversion time:** 5.5 microseconds.
- **Accuracy:** ±20 millivolts.

Analog Output Ports:
- **Number of output ports:** 7
- **Output voltage range:** −2.56 to +2.54 volts
- **Output impedance:** 0.25 ohm.
- **Maximum load current:** 1.5 mA
- **Resolution:** 8 bits
- **Conversion time:** 5.5 microseconds
- **Accuracy:** ±20 millivolts
- **Drift rate:** Less than 10 mV/sec at 25°C

Parallel I/O Port:
- **Input port:** 8 bits.
- **Output port:** 8 bits.
- **Input load:** one TTL equivalent.
- **Output drive:** 10 TTL loads.

General Information:
- **BUS:** S-100.
- **Power requirements:** + 8 volts @ 0.4 A, +18 volts @ 30 mA, −18 volts @ 60 mA

I/O Processor



MULTI-PROCESSOR CAPABILITY

With this new I/O Processor you can now have multi-processor capability in your S-100-bus system.

The new Model IOP is a true single-card computer — one that has a fast Z-80A processor, 16K bytes of RAM, and up to 16K bytes of PROM capacity.

The IOP interfaces to the S-100 host processor by means of simple "input" and "output" instructions.

SATELLITE PROCESSOR

The IOP can be used either alone or with other IOP cards as a satellite processor on the S-100 bus.

Or the IOP can process I/O channels and interface to other devices such as the Cromemco Quadart through the C-bus connector on the top edge of the card.

The IOP is an advanced development that brings a new dimension of computer architecture to Cromemco computer systems.

PRICE

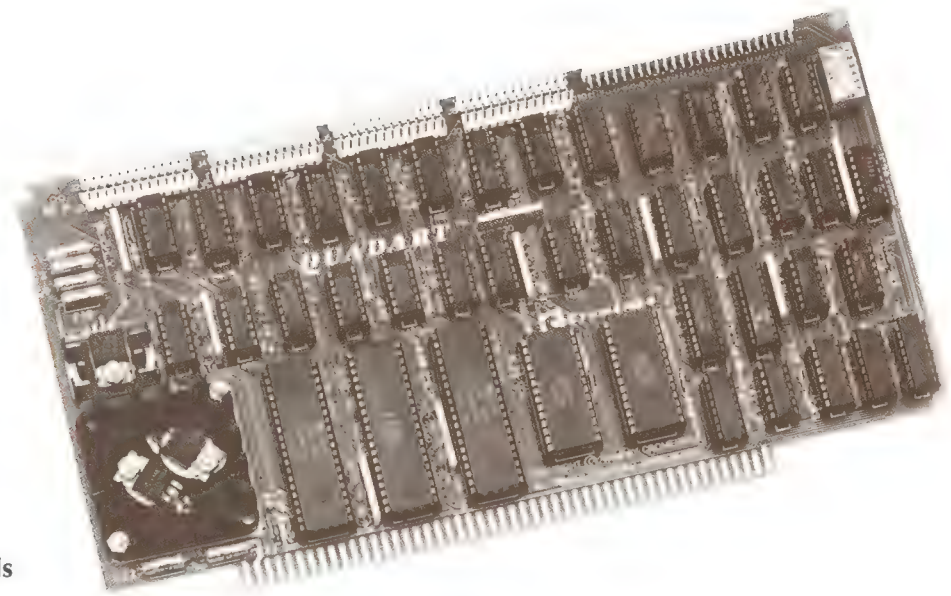
I/O Processor (Model IOP) assembled, burned in and tested $695

TECHNICAL SPECIFICATIONS
Model IOP
I/O Processor

Processor: 4 MHz Z-80A
Instruction Set: 158 instructions including the 78 instructions of the 8080
ROM Capacity: 16K bytes positioned starting on any 2K boundary (selectable by bipolar PROM).
ROM Type: Intel 2716, 2732 or equivalent
RAM Capacity: 16K bytes positioned starting on any 2K boundary (selectable by bipolar PROM)
Standard address configuration:
PROM—0000 to 1FFFH
RAM—4000H to 7FFFH

RAM Type: 4116
Host Interface: S-100 bus input-output ports
Peripheral Interface: C-bus
M1 Wait state generation: 0-1 wait states jumper wire selectable
Power requirements: + 8 volts @ 1.5A
+18 volts @ 100 mA
−18 volts @ 30 mA
Operating environment: 0-55°C

Quadart



Supporting Serial Protocols

- **Asynchronous**
- **Synchronous Bit (e.g., SDLC)**
- **Synchronous Byte (e.g., Bisync)**

SIMULTANEOUSLY INTERFACES UP TO FOUR SERIAL CHANNELS

In this versatile new QUADART serial communications interface card you get the power to satisfy virtually any high-speed data communications application.

You get four independent serial channels, each supporting Asynchronous, Synchronous Byte mode (e.g., Bisync), and Synchronous Bit mode (e.g., SDLC) protocols with complete handshaking for modems. Serial protocol is software-selectable for each channel.

Our unique loopback feature gives you the capability to connect data from any channel to any other channel, data from any modem to any other modem, or the capability for any modem/channel combination to be used for diagnostics and selftest.

Baud rates for each may be software-selected from 0 to 300K baud (asynchronous to 19,200 baud).

VECTORED INTERRUPTS

The QUADART also supports the powerful internally-prioritized vectored interrupt structure of the Z-80 microprocessor which has become a trademark of Cromemco interface cards.

INTERVAL TIMERS

You have real-time clocking capability with four interval timers each having periods as small as 4.00 microseconds. Up to three timers can be cascaded to provide a 1.000-second time interval.

The software-selectable time range of each timer is 0-16.384 milliseconds.

C-BUS

The control for the QUADART is from the C-Bus provided by Cromemco's powerful I/O processor computer, Model IOP. The IOP interfaces between your S-100 bus and the C-bus and can support up to four QUADARTS with full interrupt capability.

PRICE

QUADART Serial Communications Interface (Model QDRT) fully assembled, burned-in and tested $595

TECHNICAL SPECIFICATIONS
Model QDRT
QUADART Serial Communications Interface

Serial Channels:
- **Serial Protocols:**
  - Asynchronous Byte
  - Synchronous Byte (Bisync)
  - Synchronous Bit (SDLC)
  - Modem handshaking
- **Number of channels:** 4
- **Diagnostics:** Channel-to-channel diagnostic loopback capability (input/output channels software selectable)

Asynchronous Baud Range: 0 to 19,200 baud (software selectable)

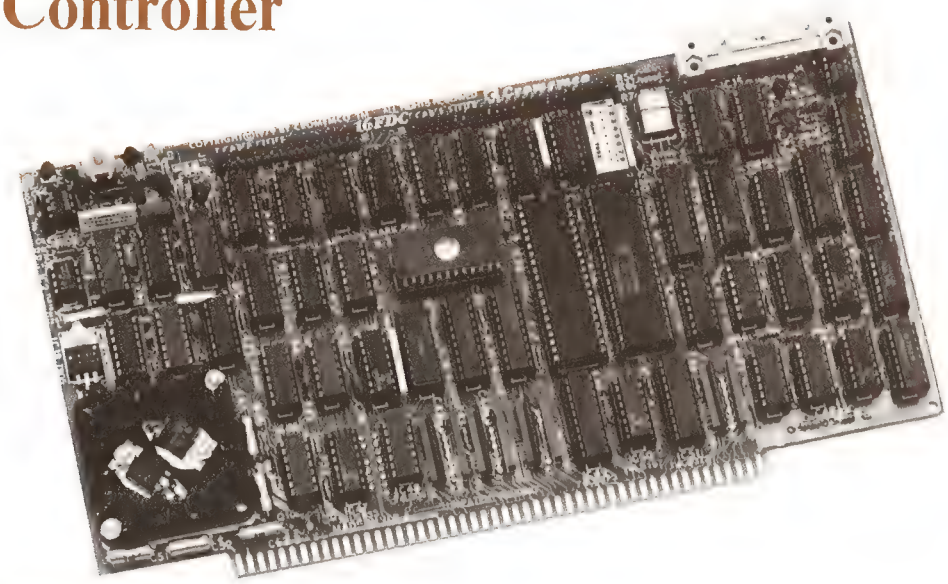
Synchronous Baud Range: 0 to 300K baud (software selectable)

Interval Timers:
- **Number of timers:** 4
- **Timer Range:** 0-16.384 msec (cascadable to 1.0 sec, software selectable)
- **Timer resolution:** 4.0 microseconds

Vectored Interrupts:
- **Number of restart locations (Z-80 mode):** 65,536
- **Prioritization of serial channels and timers:** Internally prioritized
- **Prioritization for multiple QUADARTS:** daisy-chaining

General Information:
- **Serial channel type:** Z80-SIO/2
- **Parallel channel type:** Z80-PIO
- **Timer type:** Z80-CTC
- **Interface:** C-Bus
- **Power requirements:** + 8 volts @ 1.5A
  +18 volts @ 100 mA
  −18 volts @ 100 mA
- **Operating environment:** 0-55°C

16FDC Quad-Capacity Disk Controller



For single- or double-sided, single- or double-density, 5″ or 8″ disk drives

This new disk controller enables you to have the largest storage capacity per disk size in the industry.

Specifically, it works with 390K bytes on a 5″ diskette or 1216K bytes (1.2 megabytes) on an 8″ diskette.

Such a large storage capacity has been achieved by using double-sided double-density (i.e., quad capacity) formats on each size disk drive.

The new 16FDC also supports an RS-232 interface capable of up to 76,800 baud operation. This interface is commonly used to connect a crt terminal to your system.

SYSTEM DIAGNOSTICS

A special feature of the 16FDC is that it is provided with a ROM-resident program called RDOS-II. This not only provides for system monitor and bootstrap operation but also has a complete set of system diagnostics for system maintenance and trouble shooting.

STANDARD IN CROMEMCO SYSTEMS

The new 16FDC is now used in all Cromemco floppy-disk-based systems and is designed to replace the older Model 4FDC controller in most applications.

PRICE

Disk Controller and I/O Interface (Model 16FDC) assembled, burned in and tested. . . $595

TECHNICAL SPECIFICATIONS
Model 16FDC
Disk Controller and I/O Interface

Disk controller:
- **Maximum number of 5″ drives:** 4
- **Maximum number of 8″ drives:** 4
- **Bootstrap/monitor firmware:** 4K byte ROM monitor/boot/diagnostic
- **Controller circuitry:** MOS LSI

Serial I/O Port:
- **I/O levels:** RS-232 or 20 mA current loop
- **Low Baud Range:** 110-9600 baud (software selectable)
- **High Baud Range:** 880-76,800 baud (software selectable)

Diskette Format:
- **Size:** 5″ or 8″
- **Sides:** single or double
- **Density:** single (FM) or double (MFM) (software selectable)
- **Data recovery:** analog phase-lock loop, U.S. Pat. Pending

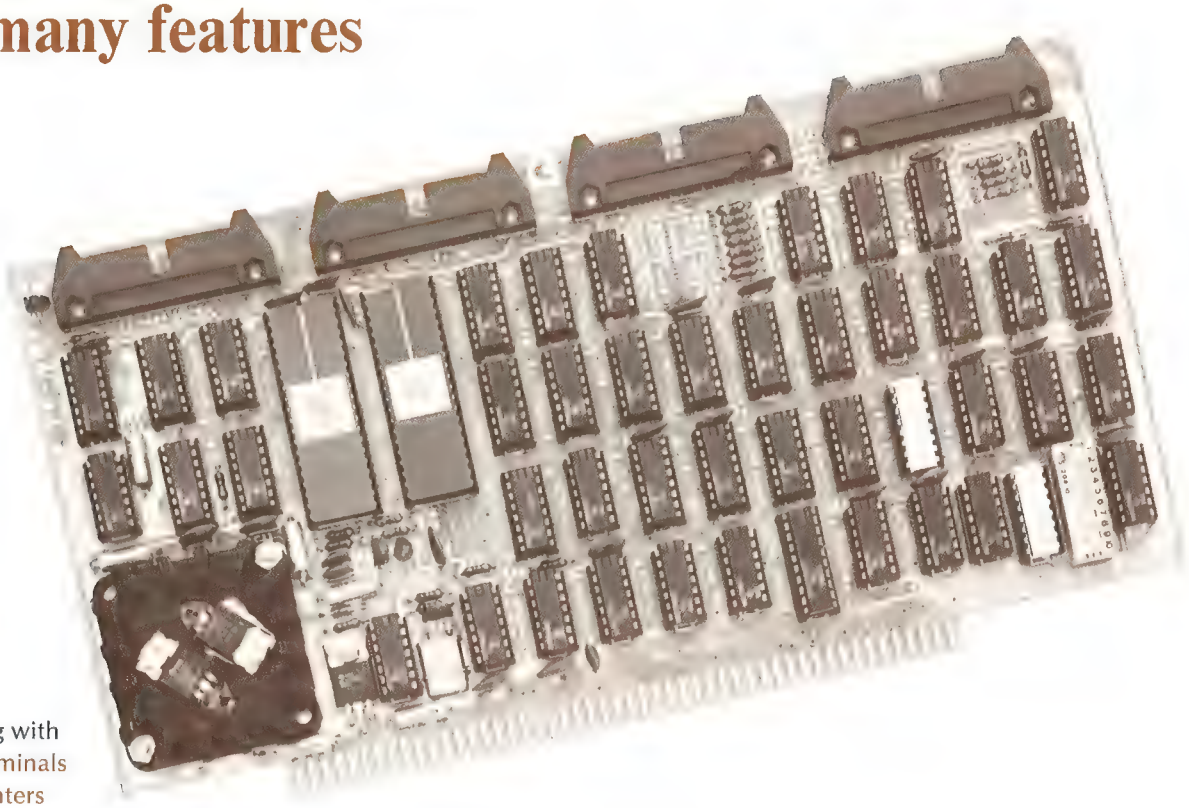
Formatted disk capacity:

	5″	8″
Single sided-single density	83K	243K
Single sided-double density	190K	600K
Double sided-single density	173K	594K
Double sided-double density	390K	1216K

Interval Timers:
- **Number of timers:** 5
- **Timer Range:** 0-16.32 msec (software selectable)
- **Timer resolution:** 64 microseconds

General Information:
- **Bus:** S-100
- **Disk controller type:** 1793-B02
- **UART type:** 5501
- **ROM type:** 2332
- **Power requirements:** + 8 volts @ 1.5A, +18 volts @ 100 mA, −18 volts @ 100 mA
- **Operating environment:** 0-55°C

TU-ART digital interface with many features



For interfacing with

- CRT terminals
- line printers
- modems
- other devices

FAST — SOFTWARE SELECTABLE BAUD RATES UP TO 76,800 BAUD

Here's a very convenient interface to let you couple not to one but to two terminals or other devices. So we call it a TU-ART.

It has two serial I/O ports, two 8-bit parallel I/O ports, and 10 independent, programmable interval timers.

Baud rates are software-selectable from 110 to 76,800 baud.

VECTORED INTERRUPTS

Yet another special convenience of the TU-ART is its vectored prioritized interrupts. It is able to support powerful vectored interrupt structure of the Z-80 microprocessor.

INTERVAL TIMERS

The 10 interval timers, since they have real-time clock capability, offer a very wide range of control possibilities.

Each timer range is from 0 - 16.32 milliseconds and is software selectable.

PRICES

TU-ART assembled, burned-in and tested (Model TRT) $345

CABLE

CBL-1 (for System Zero) $25
CBL-2 (for System Two) 62 cm long $25
CBL-3 for System Three computer; 110 cm long $25

TECHNICAL SPECIFICATIONS
Model TRT
TU-ART Digital Interface

Serial I/O ports:
- **Number of ports:** 2.
- **I/O levels:** RS-232 or 20 mA current loop.
- **Low baud range:** 100-9600 baud (software selectable).
- **High baud range:** 880-76,800 baud (software selectable).

Parallel I/O ports:
- **Number of ports:** 2.
- **Input ports:** 8 bits.
- **Output ports:** 8 bits.
- **Input load:** one TTL equivalent.
- **Output drive:** 20 TTL loads.

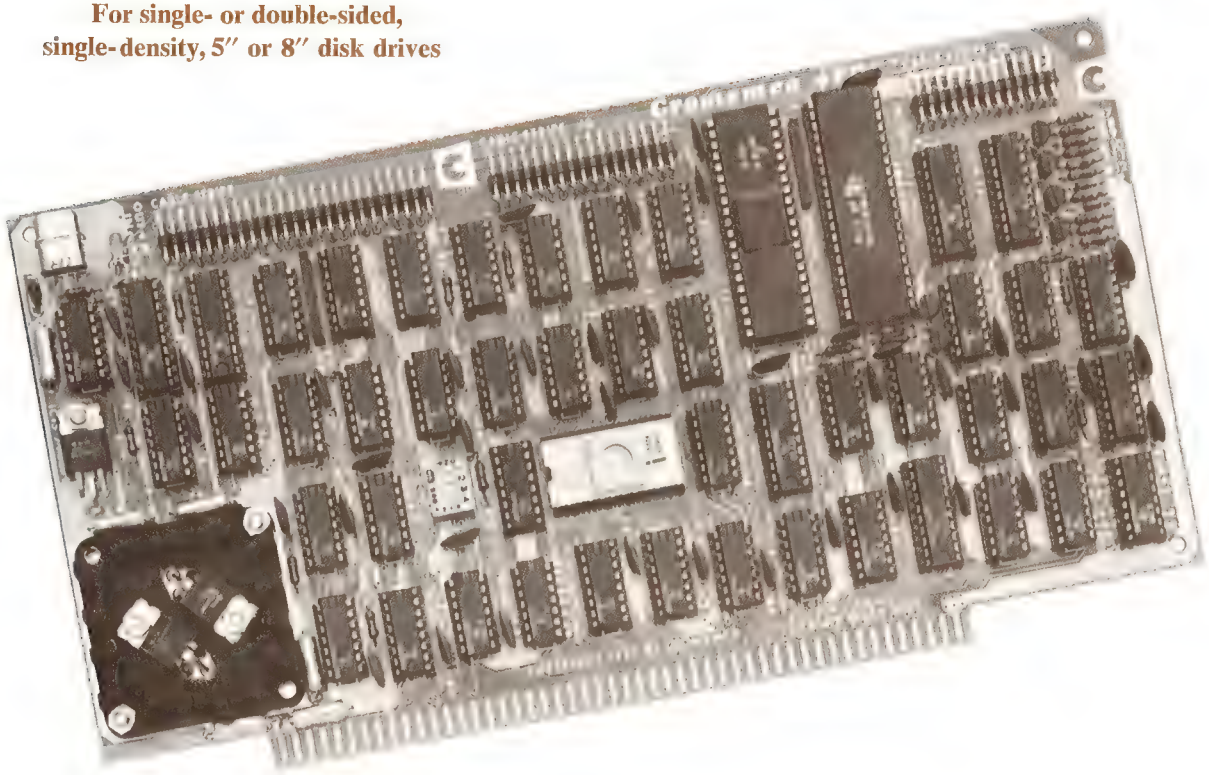
Interval timers:
- **Number of timers:** 10.
- **Timer range:** 0-16.32 msec (software selectable).
- **Timer resolution:** 64 microseconds.

Vectored interrupts:
- **Number of restart locations (8080 mode):** 8.
- **Number of restart locations (Z-80 mode):** 65,536.
- **Prioritization of TU-ART ports:** internally prioritized
- **Prioritization for multiple TU-ARTs:** daisy-chaining

General Information
- **UART type:** 5501.
- **BUS:** S-100.
- **Power requirements:** + 8 volts @ 1.0 A
  +18 volts @ 80 mA
  −18 volts @ 40 mA
- **Operating environment:** 0-55°C.

4FDC Disk Controller

For single- or double-sided, single-density, 5″ or 8″ disk drives



DISK CONTROLLER

- Many functions on one card
- Includes disk bootstrap monitor
- RS-232 interface

SIMULTANEOUSLY INTERFACES UP TO FOUR DISK DRIVES

This card is not only a disk controller but also an I/O interface.

Placing many functions on this one card is possible because we have taken the step of using LSI circuitry.

The card is capable of simultaneously interfacing up to three 5″ drives or four 8″ drives.

Its interface provisions include an RS-232 serial interface with a baud range up to 76,800 baud.

The bootstrap monitor is contained in a 1K 2308 ROM.

4FDC is designed for replacement purposes only. Use the 16FDC for new system designs.

PRICE

Disk Controller card assembled, burned-in and tested (Model 4FDC) $595

TECHNICAL SPECIFICATIONS
Model 4FDC
Disk Controller and I/O Interface

Disk controller:
- **Maximum number of 5″ drives:** 4
- **Maximum number of 8″ drives:** 4
- **Bootstrap/monitor firmware:** 1K byte PROM
- **Controller circuitry:** MOS LSI

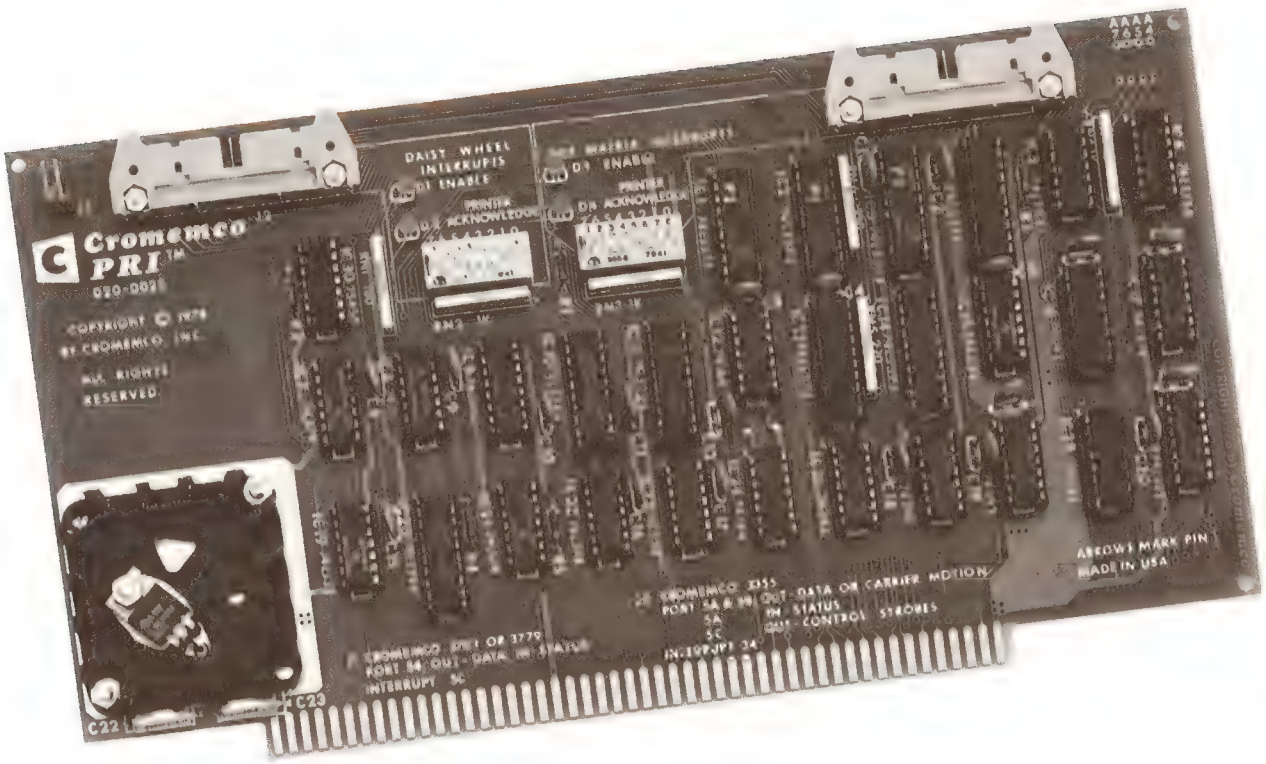
Serial I/O port:
- **I/O levels:** RS-232 or 20 mA current loop
- **Low baud range:** 110-9600 baud (software selectable)
- **High baud range:** 880-76,800 baud (software selectable)

Parallel port:
- **Input port:** 8 bits
- **Output port:** 8 bits
- **Input load:** one TTL equivalent
- **Output drive:** 20 TTL loads

Interval timers:
- **Number of timers:** 5
- **Timer range:** 0-16.32 msec (software selectable).
- **Timer resolution:** 64 microseconds

General Information:
- **Disk controller type:** 1771-1
- **UART type:** 5501
- **ROM type:** 2308
- **BUS:** S-100 (one slot only)
- **Power requirements:** + 8 volts @ 1.0 A; +18 volts @ 100 mA; −18 volts @ 100 mA
- **Operating environment:** 0-55°C

Printer Interface



- Use with all Cromemco printers

A VERSATILE CARD WITH TWO INTERFACES ON ONE CARD

With this new interface card, it's easy for you to interface either dot-matrix or full letter printers to your computer system.

To be suited to these printers, this card is designed with two actual interfaces. One uses the "Centronix parallel" convention and interfaces the Cromemco Models 3779 or 3703 dot-matrix printers.

The card's second interface interfaces the Cromemco Model 3355A Full-Letter printer.

This second interface has built-in ribbon-lift and ribbon-lowering circuitry to free the software overhead normally required for this function.

NOTE TO CROMEMCO SYSTEM TWO AND SYSTEM THREE PURCHASERS:

The Model PRI interface card described here is now supplied as standard equipment in your system.

You need not purchase this card separately unless you are adding additional printers to your system.

See Cromemco printers in Section II

Each of the two interfaces has an individual cable connection on the top edge of the card.

The Cromemco PRI card now also includes full interrupt capability for use in multi-user systems.

PRICES

Printer Interface Card assembled, burned-in and tested (Model PRI) $245

Cables for PRI interface: 25-conductor ribbon cable connects from top card connector to DB-25S socket. Lengths as follows:

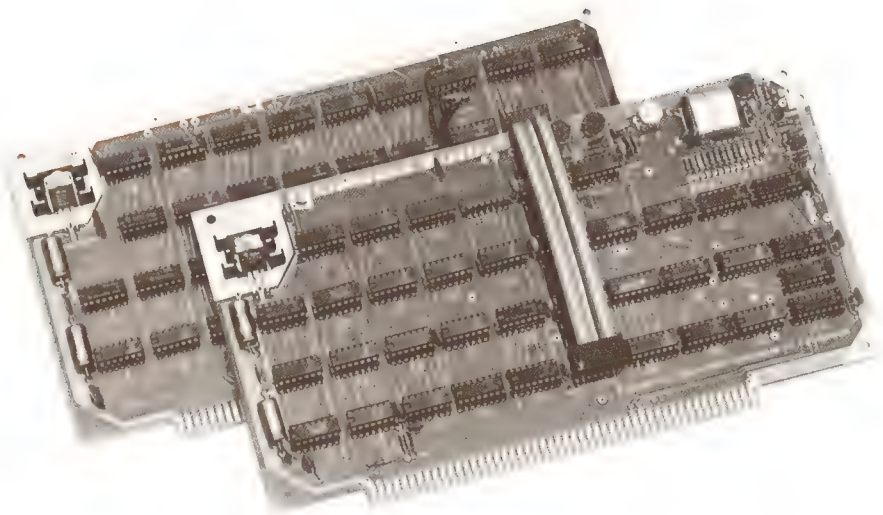
Cable 62 cm in length for use in Cromemco System Two computers (Model CBL-2) $25

Cable 110 cm in length for use in Cromemco System Three computer (Model CBL-3) $25

TECHNICAL SPECIFICATIONS
Model PRI
Printer Interface

Output port addresses: 54, 5A, 5B, 5C
Input port addresses: 54, 5A
Alternate port addresses: Optional DIP switch
Software support: Cromemco CDOS
BUS: S-100
Power requirements: +8 volts @ 1.0A
Operating environment: 0-55°C

TV Dazzler



ALPHANUMERICS PLUS ACTION, AND GRAPHICS

The Dazzler® maps your computer memory content onto your color TV screen in full color.

That doesn't mean just that you see alphanumerics in color. You can display any information in memory. And do so in color.

The Dazzler® consists of two circuit boards that plug directly into your Cromemco Computer Systems.

NEEDS ONLY 2K MEMORY

Technically, the Dazzler® scans your computer memory using direct-memory access (DMA). It formats each memory bit into a point on the TV screen to give a 128 x 128-element picture. Only a 2K-byte computer memory is required (only 512 bytes for a 32 x 32 picture).

The Dazzler® output is a video signal that goes directly to the TV video amp or to the antenna terminal through an inexpensive commercially-available device.

PRICE

TV Dazzler assembled, burned-in and tested (Model CGI) $395

DAZZLER GAMES

A set of over a dozen games you can play with the Dazzler. Available on either 5″ or 8″ diskettes. Each diskette includes CHESS, SPACE WAR, 4D TIC-TAC-TOE, TANK WAR, DAZZLE-MATION, CHASE, TRACK, DAZZLE-DOODLE, GOTCHA, LIFE, KALEIDOSCOPE, DOG-FIGHT, MAGENTA MARTINI, and AMBUSH.

PRICES

Dazzler Games on 5″ diskette (Model FDG-S) . . $95
Dazzler Games on 8″ diskette (Model FDG-L) . . $95

DAZZLER GRAPHICS

A program to use the Dazzler to display graphs, graphics and alphanumeric displays in color on a TV set. Available on either 5″ or 8″ diskettes.

PRICES

Dazzler Graphics on 5″ diskette (Model DGR-S) $95
Dazzler Graphics on 8″ diskette (Model DGR-L) $95

TECHNICAL SPECIFICATIONS
Model CGI
TV Dazzler

Display format: 128 x 128, 64 x 64, or 32 x 32 (software selectable).
Colors available (color mode): Red, green, blue, cyan, magenta, yellow, white, black.
Gray-scale available (B&W mode): 16 intensities.
System memory required: 2K bytes (512 bytes for low resolution mode).
Memory access: DMA.
DMA rate: 1 megabyte/second.
Video output: composite video TV signal.
BUS: S-100 (two slots required).
Power requirements: + 8 volts @ 1.4 A
−18 volts @ 50 mA
Operating environment: 0-55°C

Card Cages

Model CC-21

Model CC-12

Model CC-8

8-, 12-, OR 21-SLOT VERSIONS

Ideal for your OEM or Home-brew system requirements, these S-100 bus card cages are built with the quality you've come to expect from Cromemco.

The card cages themselves are of sturdy steel construction and include a rugged retaining bar to insure that cards cannot be shaken from their sockets.

The back planes include a full set of edge connectors which are wave-soldered in place on our exclusive shielded mother board that we call the Blitz Bus.

Available in an 8-, 12-, or 21-slot version.

CARD CAGE BUYER'S GUIDE

Model	Dimensions (Inches)			Number of Slots	Price
	H	W	L		
CC-8	6⅝	10⅞	7	8	$ 195
CC-12	6⅝	10⅞	10¼	12	$ 245
CC-21	6⅝	10⅞	16¾	21	$ 395

PS-8 Power Supply

A convenient power supply to use with our Model CC-8 card cage. Then plug in the circuit cards of your choice.

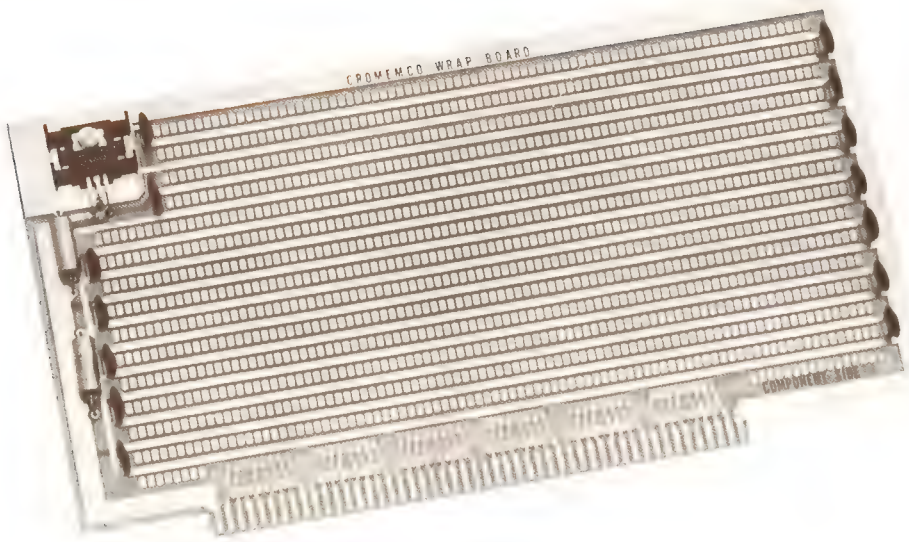
Unit provides +7.5 volts @ 12A, +14.5 volts @ 25A, and –14.5 volts @ 1A. Ferroresonant transformer design provides for steady output voltage for line voltages 90-130 VAC or 180-260 VAC.

PRICES

Model PS8-60
(for 60-Hz operation) $345

Model PS8-50
(for 50-Hz operation) $345

Wire wrap Extender cards

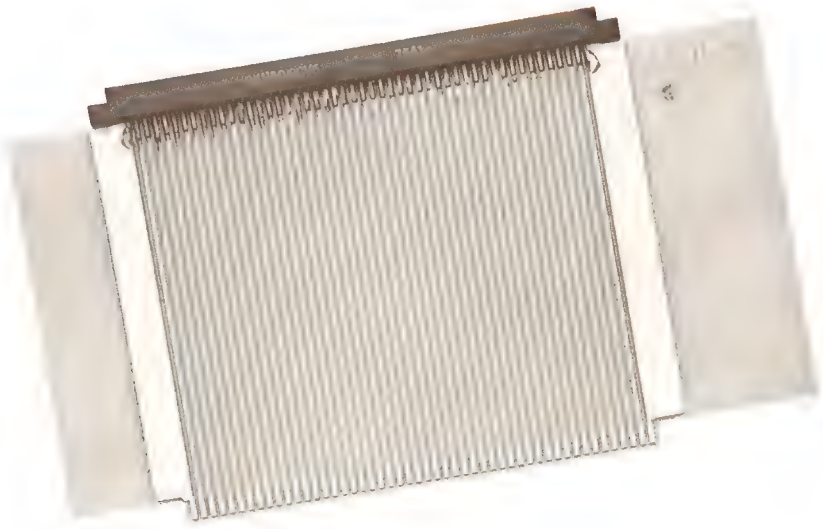


Wire Wrap Card

A high-quality wire wrap board for building your own cards for your computer. Will hold over 70 integrated circuits. A 5-volt power supply is included on the board. Uses tantalum decoupling capacitors and disk ceramic bypass capacitors. Edge contacts are gold-plated for long, trouble-free life.

PRICE

Wire Wrap Board assembled
(Model WWB) $65



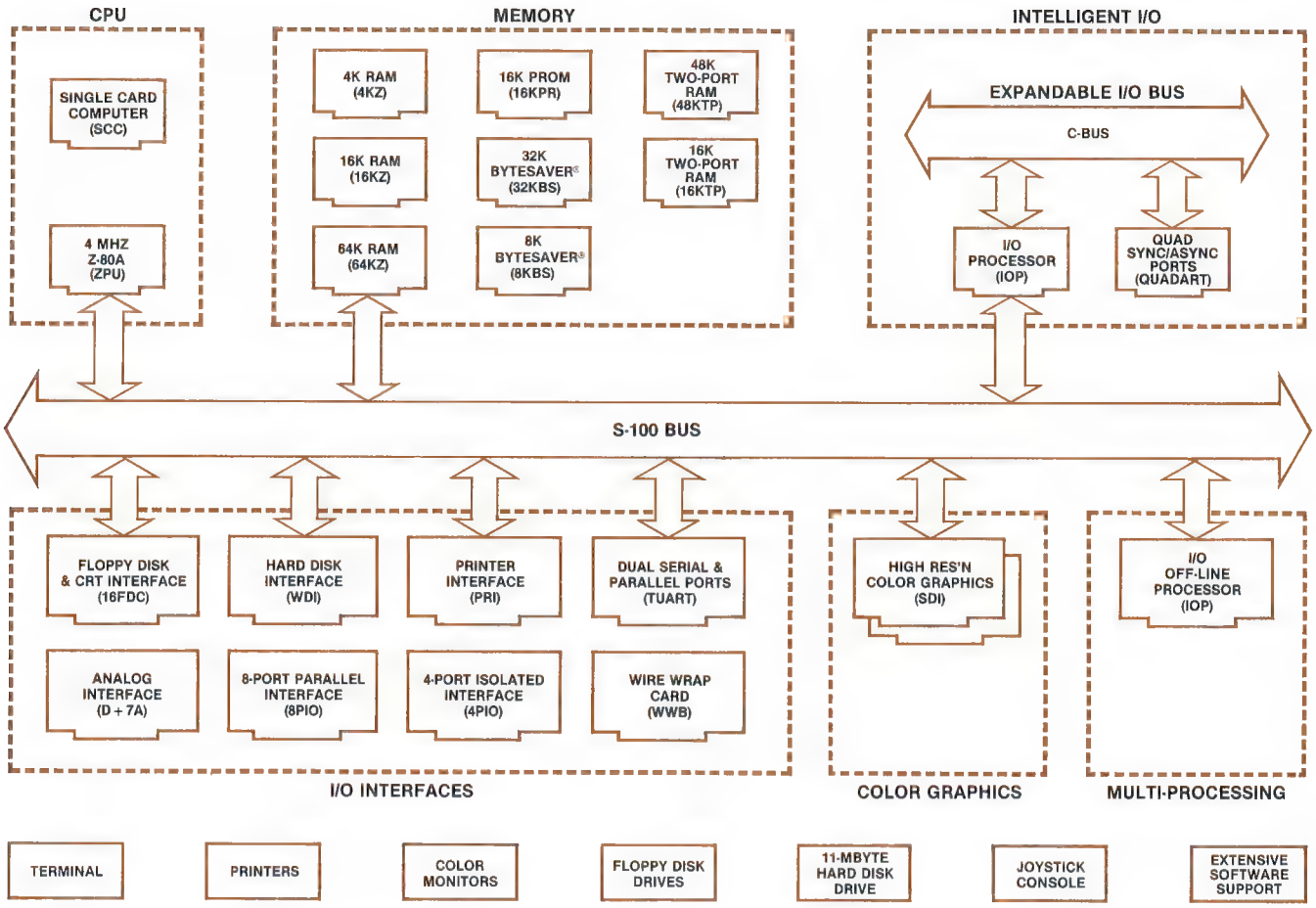
Extender Card

The card you need when experimenting with or troubleshooting your computer. Extends computer boards above case for easy connection of voltmeter, logic probe, or oscilloscope. Compatible with all S-100 boards. Edge contacts are gold plated for long, trouble-free life.

Connector is included (photo).

PRICE

Extender Card assembled (Model EXC) $65



CROMEMCO COMPUTER CARD CAPABILITY

The Cromemco computer cards appearing on the previous pages are related for you in a functional way in the above diagram.

MULTI-PROCESSING AND INTELLIGENT I/O

The range of capabilities and versatility these cards give you is **impressive indeed.**

In processors, for example, you have a choice of CPU's including our new I/O Processor. This can be used as a satellite processor to do off-line processing, multi-processing, and to form intelligent I/O. It opens the door to a whole new group of applications and tasks.

HIGH RESOLUTION COLOR GRAPHICS

You can have beautiful high-resolution color graphics with our color graphics interface (SDI). You can select from over 4000 colors and have a picture with a resolution at least equal to that of quality broadcast-TV pictures.

You also have an unprecedented selection of memory including our unusual 48K and 16K **two-port** RAMs which allow high-speed color graphics.

POWERFUL SOFTWARE AND PERIPHERAL SUPPORT

There's much more yet you can do with the cards shown in this catalog, all made easy with our card cages and power supply.

Cromemco also offers the strongest software support in the industry (see next section in this catalog). In addition, there is a wide choice from independent vendors.

Section IV
Software

Cromemco has an impressive reputation for the quality of our software and thoroughness of our documentation.

TWO OPERATING SYSTEMS

We offer two operating systems, known as CDOS and CROMIX.

CDOS is a single-user, single-task operating system for disk file management. It is described briefly below.

CROMIX is our powerful new multi-user, multi-task operating system. It has advantages not previously found in operating systems developed for 8-bit microcomputers. See the CROMIX details given on another page in this section of our catalog.

CROMEMCO DISK OPERATING SYSTEM (CDOS)

Cromemco disk-based software packages comprise a totally-integrated system running under our CDOS Operating System.

CDOS is the framework through which all disk file management is handled. CDOS features include:

(1) SYSTEM I/O. System Input/Output processing for the console, printer, disk, etc.

(2) FILE MANAGEMENT. Symbolically-named files can be created, erased, opened, and closed. Files can be written to and read from both sequentially and randomly.

(3) CONSOLE PROCESSOR. The Console Processor allows the user to display the disk directory, log on new disks, save new disk files, and rename existing files. Executable files may be run from the console, in batch mode, or from other programs.

(4) READ-AFTER-WRITE. After each record is written to the disk, it is read back to assure data integrity. A disk write error message is displayed if the data is not written properly.

(5) CDOS GENERATOR. The user can generate an operating system to match a particular hardware configuration. In addition to the amount of memory in the system, the user can specify the number, location, and types of disk drives.

The Console Processor includes a number of commands which are intrinsic to CDOS. These are useful for manipulating disk files from the console:

(1) ATTRIBUTES — establishes or changes the allowable file access modes. Erase, Write, and/or Read protection may be specified.

(2) DIRECTORY — lists all or specific disk file names and sizes.

(3) ERASE — deletes files from the disk directory and releases the disk space which the files occupied.

(4) RENAME — changes the file name of an existing file.

(5) SAVE — causes the user area to be saved as a disk file.

(6) TYPE — displays an ASCII disk file on the console (and printer.)

CDOS is supplied on all system disks except our C compiler which requires the CROMIX operating system. CDOS is automatically loaded into RAM during boot-up. Also supplied with all systems software disks are a number of CDOS utility programs:

(1) BATCH — allows the user to execute a file of commands from CDOS.

(2) DUMP — displays the contents of an ASCII *or* binary file in hexadecimal on the console (and printer). A column on the right of the listing is devoted to the ASCII translation of the dump.

(3) INITIALIZE — is used to format disks.

(4) STATUS — displays any errors in the disk directory as well as a summary of the use of disk and RAM space.

(5) WRITE SYSTEM — is used to transfer the boot file from/to the front of the system disk.

(6) TRANSFER — is used to transfer files from a disk or other device to another disk or other device.

(7) SCREEN EDITOR — is an easy-to-use screen-oriented text editor. SCREEN is ideal for those who are not familiar with the use of a computer, since it continuously prompts the user with the available commands, always displaying a full screen of text. SCREEN may be used in conjunction with the Cromemco FORMATTER to yield a powerful Word Processing System. Note that SCREEN is designed for use *only* with Cromemco terminals.

(8) TEXT EDITOR — is a conventional character-oriented text editor. It incorporates many powerful features and allows conditional as well as multiple replacements throughout the file being edited.

COBOL Compiler

COBOL

The Cromemco COBOL compiler contains all of the features of Level 1 COBOL as required by the 1974 American National Standard (ANSI) X3.23-1974 as well as the most useful options of Level 2.

The Level 1 features include the standard Nucleus, Sequential Files, and Table Handling. RELATIVE, INDEXED, and SEQUENTIAL files may be used. The COPY statement speeds program development by allowing the programmer to include source libraries. Our COBOL also supports COMPUTATIONAL-3 data to give more compact storage of decimal data on a disk (by packing 2 digits per byte).

Powerful Level 2 features of Cromemco COBOL are:

- COMPUTE — simplifies computations by combining multiple arithmetic statements.
- OPEN EXTEND — permits you to add records to an existing sequential file without first copying all previous records to a new file.
- CALL — to execute your standard, precompiled routines with a single statement.
- STRING—easily combines several data items into one field.
- UNSTRING — easily separates one data item into several fields.

For rapid error isolation, our COBOL also includes EXHIBIT, READY, TRACE, and RESET TRACE.

Another important feature is that the compiled code is relocatable and uses the same relocatable code format as our FORTRAN IV and our Macro Assembler. This means that segments of programs written in FORTRAN or Assembly Language may be easily called from a COBOL program.

Since COBOL is the most popular language now in use for business application programming, Cromemco computers with COBOL are particularly well suited to business applications.

Some other features of Cromemco COBOL include: A SCREEN SECTION format in the Data Division that allows a concise desription of one or more screen forms. Segmentation implemented to ANSI Level I allows compilation and execution of programs too large to fit directly into memory. And file integrity protection measures are provided.

COBOL programs compile and execute properly both under CDOS and under CROMIX with the Cromemco CDOS simulator.

PRICES

COBOL Compiler on 5" diskette
(Model FDC-S) $595

Cobol Compiler on 8" diskette
(Model FDC-L) $595

ANSI-Standard FORTRAN IV Compiler

Cromemco FORTRAN IV provides new capabilities for users of Z-80 based microcomputer systems. This is a complete implementation of ANSI standard FORTRAN X3.9-1966, except that there is no complex data type and specification statements must appear in a specific order. Users can therefor take advantage of the large number of application programs already written in FORTRAN.

Cromemco FORTRAN IV operates under the CDOS Operating System and provides both sequential and random disk file access. Files may be named at run time by use of the CALL OPEN statement. The ENCODE and DECODE statements provide the user with formatted data transfer within memory.

Variables may be declared as DOUBLE PRECISION for full 16-decimal digit precision. Other available data types include BYTE, LOGICAL*1, LOGICAL*2, INTEGER*1, INTEGER*2, REAL*4, and REAL*8. For ease in coding, our FORTRAN allows the literal form of Hollerith data; that is, literals may be enclosed in apostrophes.

Since Cromemco FORTRAN IV produces relocatable code, FORTRAN modules may be linked with the code produced by the Cromemco Relocatable Assembler, and the Assembler can access scientific and arithmetic routines located in the FORTRAN IV library. This library is searched by the linker to resolve any undefined subroutine calls. This means that only the specific subroutines and system routines required to run a Cromemco FORTRAN program are loaded before execution.

PRICES

All disk software packages include manual and complete documentation.

FORTRAN IV on 5" disk (Model FDF-S) $295
FORTRAN IV on 8" disk (Model FDF-L) $295

RATFOR/FORTRAN IV

RATFOR WITH FORTRAN IV

Cromemco RATFOR (an acronym for RATional FORtran) is a FORTRAN preprocessor that brings the advantages of structured programming techniques to the widely used FORTRAN language.

The new structures allowed in RATFOR include:

- BREAK — exits from a loop.
- NEXT — skips remainder of a loop.
- IF-ELSE — branch implementation.
- REPEAT-UNTIL — loop with test at end.
- WHILE — loop with test at beginning.

The RATFOR preprocessor produces FORTRAN IV code that can be compiled by the Cromemco FORTRAN compiler included with this software package.

The FORTRAN code produced by the RATFOR preprocessor is indented, for easily readability, in accordance with block-structured principles.

The RATFOR software package includes:

(1) A copy of the RATFOR preprocessor and support programs.
(2) The RATFOR reference manual.
(3) The RATFOR book, *Software Tools* by Kernighan and Plauger.
(4) Cromemco's FORTRAN IV compiler with LINK, the linking loader.
(5) The Cromemco FORTRAN IV instruction manual.

PRICES

On 5'' disk (Model FDR-S) $395
On 8'' disk (Model FDR-L) $395

Z-80 Relocatable Macro Assembler

Z-80 MACRO RELOCATING ASSEMBLER

The Cromemco Z-80 Macro Assembler is a two-pass assembler which reads source code from a disk file, assembles it, and produces listings and an object file either in relocatable or in Intel hex format. It is both a Macro and Conditional Assembler.

LINK, the Cromemco Relocating Linker/Loader, may then be used to load the assembled code into memory and resolve any external references. The completely assembled and linked machine code may then be saved in a disk file for execution. The assembler and linking loader allow one to create and assemble a number of different modules separately, and then link them together as desired at run-time. These modules may include FORTRAN Library routines as well as those generated by the FORTRAN and COBOL computers.

Also included on the assembler disk is DEBUG, a support program which allows machine language programs to be traced, disassembled, patched, or programmed into PROM. DEBUG also allows the user to establish break points, display and alter the Z-80 registers, and initiate normal or step-by-step program execution.

PRICES

All disk software packages include manual and complete documentation.

Z-80 Assembler on 5'' disk
(Model FDA-S) $295
Z-80 Assembler on 8'' disk
(Model FDA-L) $295

16K Disk Extended BASIC

CROMEMCO 16K DISK-EXTENDED Z-80 BASIC

Cromemco 16K Disk-Extended BASIC was specifically designed to meet the most demanding requirements of business firms while also providing the flexibility and speed necessary for real-time control applications. It fully utilizes the extensive 158-instruction set of the Z-80 microprocessor to maximize computational precision (a full 14 digits), programming power, and speed of execution.

Some additional features are extended string and sub-string handling capability, PRINT USING for Cobol-like formatted output, TRACEing of program execution, dynamic error trapping, random and sequential disk file access through CDOS, program chaining and overlays, multiple statements per line, renumbering of lines, and direct machine language interaction with INP, OUT, PEEK, POKE, and USR commands.

Other features of this powerful BASIC include:

- A semi-compiling design which combines the best features of both an interpreter and a compiler. This yields exceptionally fast execution times
- Three types of variables:
  (1) Integer (2 bytes) range +32767 to −32768
  (2) Short Floating Point (4 bytes) range ±9.99E+62 to 9.99E−65, accuracy to 6 digits
  (3) Long Floating Point (8 bytes) range ±9.99E+62 to ±9.99E−65, accuracy 14 digits
- Advanced floppy disk I/O capabilities
- Binary and ASCII storage for both programs and data
- Sequential and random access files
- English language error messages
- Syntax error checking as program is entered
- Dynamic error trapping
- TRACE and immediate mode to facilitate debugging
- Advanced output formatting capabilities
- Advanced string handling capabilities
- Chaining of programs
- Direct machine language interaction

PRICES

16K BASIC on 5″ disk (Model FDB-S) $195

16K BASIC on 8″ disk (Model FDB-L) $195

A complete list of our 16K BASIC instructions set is given below.

Instructions

Abbreviations:

A, B, C, D	variables
m, n, p, r	integers
E, F, G, H	expressions or variables (H may be relational)
L1, L2	line numbers
stmnt	statement
strng	string expression
[ ]	optional parameter
{ }	choose one parameter may be repeated
ln	file number
p1, p2	parameters
a	one letter
*	do not use with line no
**	use only with line no
†	disk basic only
byte	byte value
fmt	format
dr:	drive

ABSolute value (E)
ASCii (AS)
ATN(E) arctangent
* AUTOLine L1, L2

BINAND (A, B)
BINOR (A, B)
BINXOR (A, B)
† BYTE

CHR$ (A) ASCII character
CLOSE [\m]
* CONtinue
COSine (E)
† CREATE string

** DATA [A] [,strng] [,b]
DEGree
DELETE L1, L2
DEF FNc (A) = E
DIM A (m) [, B(n, p, r)]
†* DIRectory [dr:] [strng]
† DiSK [dr:]

ECHO
** END
ENTER strng
† ERASE strng
ESCape
EXPonent (E)
FOR A = E TO F [STEP G]
NEXT A
FRActional part (E)
FREe space (E)
GET\ln [, p1 [,p2]] \{E, F]
GOTO L1
GOSUB L1
RETURN

IF H THEN {L1} [stmnt]
IMODE
INPUT [\ln, p1, p2\] [strng;] A[,B] [,]
INTEGER A [(m)] [, B]
INTeger (E)
INP (m)
IOSTAT (ln, m)
IRN (E) integer random number generator

LENgth (AS)
[LET] A = E
LFMODE
LIST [strng,] [L1] [,L2]]
LONG A [(m)] [, B]
LOGarithm (E)
† LOAD strng

MAXimum (E)
† MAT A = E
MINimum (E)

NOECHO
NOESCape
NoTRACE

ON E GOTO GOSUB L1
ON ERROR {STOP} {GOTO} {GOSUB} L1
ON ESCape {STOP} {GOTO} {GOSUB} L1
OPEN \ln [, p1[, p2]] \, strng
OUT m, byte

PEEK (m)
POSition (AS, Ys, n)
POKE m, byte
[PRINT] [@] [\ln, p1, p2\ ] [USING fmt;] {E [;] [,] } F]]
PUT \ln [, p1 [, p2]] \{E, F]

RADians
RANDOMIZE
READ A [,B]
REM [anything you want]
RESTORE
* RENUMBER
† RENAME strng-old, strng-new
RND (E) random number generator values
RUN [strng]

† SAVE strng
SCRatch
SET m A
SFMODE
SGN (E) algebraic sign
SHORT A [(m)] [,B]
SINe (E)
SPaCe (E) use with PRINT
SQR (E) square root
** STOP
STR$ (n) strng
SYStem (E)

TANgent (E)
TAB (E) use with PRINT
TRACE

USeR (A, p1 [,p2])

VALue (AS)

32K Structured BASIC

FEATURES OF CROMEMCO 32K STRUCTURED BASIC

In addition to all of the commands found in Cromemco 16K BASIC the following features and commands will be found in 32K BASIC. This BASIC is designed to run in a Cromemco system with not less than 64K of memory.

Variable names and label names may contain up to 31 characters and may start with an alphabetic character and contain any combination of alphabetic and numeric characters including the apostrophe ('). Line numbers may also be used as label names.

SOPHISTICATED KSAM

A highly sophisticated KSAM (Keyed Sequential Access Method) has been incorporated in Cromemco's 32K BASIC. This feature is very useful in establishing data bases for various applications.

STRUCTURED PROGRAMMING

With the introduction of WHILE and REPEAT loops and the IF - THEN - ELSE instruction group, structured programming in BASIC becomes a reality. This leads to better, more readable code, which in turn leads to faster debugging and easier maintenance of programs and systems.

The interactive program Editor allows the programmer to perform the following functions on one or more program lines:

FIND all occurrences of a string,
CHANGE all or selected occurrences of a specified string, and
EDIT selected lines by inserting or deleting characters.

PROCEDURES are called from memory or a PROCEDURE library and may include both global and local variables. PROCEDURE names may contain up to 31 characters and many start with a period (•) and contain any combination of alphabetic and numeric characters including the apostrophe ('). A PROCEDURE is defined by:

PROCEDURE name (optional calling parameters)
•
code
•
ENDPROC (optional return parameters)—returns from procedure
or
ERRPROC—sets BASIC error flag and returns from procedure

PRICES

32K Structured BASIC on 5" disk (Model STB-S) $295
32K Structured BASIC on 8" disk (Model STB-L) $295

SPECIAL STRUCTURED BASIC COMMANDS

EXIT — deletes all active control structures (GOSUB, FOR, WHILE, DO, IF-THEN-ELSE, and REPEAT) on the run time stack up to the most recent procedure call or, if no procedure has been called, up to the beginning of the program.

DELREM — deletes REMark statements for more efficient storage of source files and to allow greater confidentiality of source code.

LVAR — lists all variables and their type as well as the values of scalar arithmetic variables.

IF . . . THEN DO . . . ELSE . . . ENDDO sequence allows the programmer to implement a full IF - THEN - ELSE structure.

COMMON — allows variables to remain in memory as new routines are loaded into memory during execution.

EXPAND — will insert null characters in a string variable so that the programmer can insert characters in the middle of a string.

NOLIST — causes sections of code to become **executable only** code, thereby protecting the security of some sections of code while allowing the user to freely access other sections of code.

CLEAR — will recover user space (memory) from previously deleted lines.

WHILE . . . ENDWHILE loops are an implementation of conditional loops with a test at the start of the loop. It is possible for the WHILE loop to be executed zero times if the condition is not met when the loop is entered.

REPEAT . . . UNTIL loops are an implementation of a conditional loop with the test at the end of the loop. The contents of a REPEAT loop will always be executed at least once.

KSAM ROUTINES

pf — primary file
if — inversion (also called a secondary or alternate file)
fname — file name may be a string or string variable
pfn — file number may be a constant or arithmetic variable
ifn — inversion file number
pkey — primary key may be a string or string variable
skey — secondary key

Initialize and preformat a KSAM file:
KCREATE/pf record length, key length [, Kload space [, =volumes]]/fname **KALTCREAT**/pfn, skey length [, skey displacement [, =volumes]]/fname
Rename (all segments of) a file:
KRENAME old-fname , new-fname
Erase (all segments of) a file
KOPEN /pfn/fname
KALTOPEN /ifn,fn/fname
Close a file:
KCLOSE /pfn/
Get the next, current, or previous record based on the collating sequence of the primary keys:
KGETFWD /pfn/ [item list]
KGETCUR /pfn/ [item list]
KGETBACK /pfn/ [item list]
Read a random record based on the primary key value:
KGETKEY /pfn,pkey/ [item list]
Read the nth record of the file (relative to the first).
KGETREC /pfn,record number/ [item list]
Read additional data from record already referenced:
KGET /pfn/ [item list]
Add a record to the primary file in the proper sequence by primary key:
KADD /pfn,pkey/ [item list]
Add a record to the primary file, preserving the file spacing:
KLOAD /pfn,pkey/ [item list]
Add additional data to an already referenced record:
KPUT /pfn/ [item list]
Change data in a record without changing the primary key:
KUPDATE /pfn,pkey/ [item list]
Delete a record from the primary file:
KDEL /pfn,pkey/
Add, delete, and verify secondary file entries.
KALTADD /ifn/
KALTDEL /ifn/
KALTVER /ifn/
Read a primary file record based on the secondary key:
KALTCUR [ifn/ [item list]
KALTFWD /ifn/ [item list]
Specify a new secondary key and read the first corresponding primary file record:
KALTFIRST /ifn,skey/ [item list]
Read the primary key of the current record:
KRETRIEVE /pfn/ string variable

Word Processing System

Cromemco Word Processor

EXAMPLE

This text was generated and formatted by the Cromemco Word Processing System. Notice that it is both right and left justified. The new Formatter II program will output

superscripts^{1}, and
subscripts$_{2}$

when used in conjunction with the Cromemco 3355A Printer.

When run under the Cromix* Operating System, the Screen Editor and Formatter II program form a powerful multi-user Word Processing System.

Formatter II allows the user to control many facets of the output. Among these are:

1. page size,
2. placement of illustrations,
3. **bold** or underlined type,
4. items to be included in the index (printing or non-printing index entries),
5. and a host of other features.

The Cromemco Word Processing System is a combination of the popular Cromemco Screen Editor and the new Formatter II program for the professional preparation of documents.

The text which is output may be right and left justified, centered, or left justified with a ragged right margin.

Key words and phrases (up to 126 characters) can be noted and included in an automatically prepared alphabetized index.

To take maximum advantage of the features of this Word Processing System, it should be run on a system which includes a Cromemco 3102 Terminal and a Cromemco 3355A Printer.

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*trademark of Cromemco, Inc.

The accompanying illustration gives you an example of the variety of styles the Cromemco Word Processor will give you, i.e., wide or narrow justified columns placed at any point across the page.

WORD PROCESSING SYSTEM

The Cromemco word processing system is a combination Screen Editor and Formatter for the professional preparation of documents.

Lines of text may be left- or right-justified or centered.

Key words can be noted and included in an alphabetized index which is automatically prepared.

The Word Processing system supports multiple columns per page, tabs, footnotes, and user-inserted text (for form letters). Page numbers can go as high as 9999 for long documents.

This word processing system is designed for use on Cromemco System Two or System Three computers with 48K or more of memory.

PRICES

WORD PROCESSING SYSTEM on 5" disk
(Model WPS-S) $295
WORD PROCESSING SYSTEM on 8" disk
(Model WPS-L) $295

Data Base Management System

DATA BASE MANAGEMENT SYSTEM

Cromemco's Data Base Management system is a disk-based system designed to run on Cromemco System Two or System Three computers with 64K of memory.

This advanced software package can be used for mailing lists, inventory control, personnel records, order entry, or other important business applications.

To create a data base an operator simply specifies the field attributes, and then specifies the sorts by which the data can be retrieved (e.g., by state, by name, by state by city by name, etc.)

The system overcomes the limitations of key-access methods in that multiple keys to the data base can be defined and redefined at any time. Storage space for the key files can be deleted as desired, and recreated at a later time.

PRICES

DATA BASE MANAGEMENT SYSTEM on 5" disk
(Model DBM-S) $395
DATA BASE MANAGEMENT SYSTEM on 8" disk
(Model DBM-L) $395

INCLUDES DBR

Our DBMS data-base system also includes our data-base report writer (DBR).

DBR permits DBMS users to create special reports in a wide variety of formats.

LISP

Cromemco LISP is a highly-evolved high-level language used particularly in artificial intelligence work. It is used in such interactive data-base applications as systems that understand natural language, systems for symbolic manipulation of mathematical expressions, intelligent controllers, CAD, and design automation.

Programs in LISP are also used in such work as internal medicine for diagnostic assistance and in geology to assist in interpreting geological data.

Cromemco LISP has a virtual storage capability such that an "autoload" feature allows infrequently-used functions and symbols to be stored on disk, thereby allowing larger user programs.

Comprehensive error-trapping capabilities have also been included in this Cromemco LISP.

In addition, this LISP incorporates many advanced features including standard control constructs such as COND, PROGN, CATCH/THROW, OR, AND, IF DO, LET; complete string and character-processing capabilities; both fixed and floating-point arithmetic; a full complement of property-list functions to provide a powerful tool for constructing data bases; generalized I/O; the capability of interfacing with non-LISP procedures; a comprehensive library with over 150 utility functions; a table-driven, user-modifiable parser that allows the programmer to redefine the scanner and define a new LISP syntax; and MACRO facilities which include READ macros and general macros.

The complete documentation included with Cromemco LISP includes a copy of the book, "Artificial Intelligence Programming."

PRICES

Cromemco LISP on 5" diskette with full documentation (Model LSP-S) $395

Cromemco LISP on 8" diskette with full documentation (Model LSP-L) $395

'C' Compiler

Now available

A COMPLETE IMPLEMENTATION

The Cromemco C Compiler has all the features needed to permit applying structured programming techniques in solving a wide range of programming problems. In fact, it has all the key features of the C language described by the defining text, The C Programming Language.

Cromemco's C compiler is written in Cromemco C, as are several other Cromemco software packages. C programs consist of one or more functions that can be written in a single module or in several modules. These are then compiled separately and linked together.

Data types include **char**acter, **int**eger, **long** integers, **float**ing point, and **double** precision floating point.

The floating point is BCD for a full 14 digits of accuracy in the range ± 9.99E-65 to ± 9.99E+62.

Data declarations in Cromemco C language can be as simple or complex as needed. Pointer variables, structures (known as records in other languages), and unions are all implemented.

WELL-STRUCTURED PROGRAMS

Cromemco C has the statements needed to write well-structured programs: **if..else, for..while, do..while, continue, break, return,** and **switch** (known as **case** in some other languages).

Cromemco C has more than 40 operators including arithmetic, bitwise, logical, relational, and shift operators, and unary operators like pre- and post-increment, address of, and size of.

The Cromemco C library contains more than 40 functions that perform formatted and unformatted I/O to terminals, disk files, and printers.

CROMIX SYSTEM CALLS

Moreover, there are functions that place more than 45 CROMIX system calls at the fingertips of the C programmer, a feature unique to Cromemco C.

RUNS UNDER CROMIX OR CDOS

Cromemco C programs are compiled on a CROMIX system. They can then be linked with either the CROMIX C function library to run on a CROMIX system or the CDOS C function library to run under either CDOS or CROMIX.

SOFTWARE PACKAGE

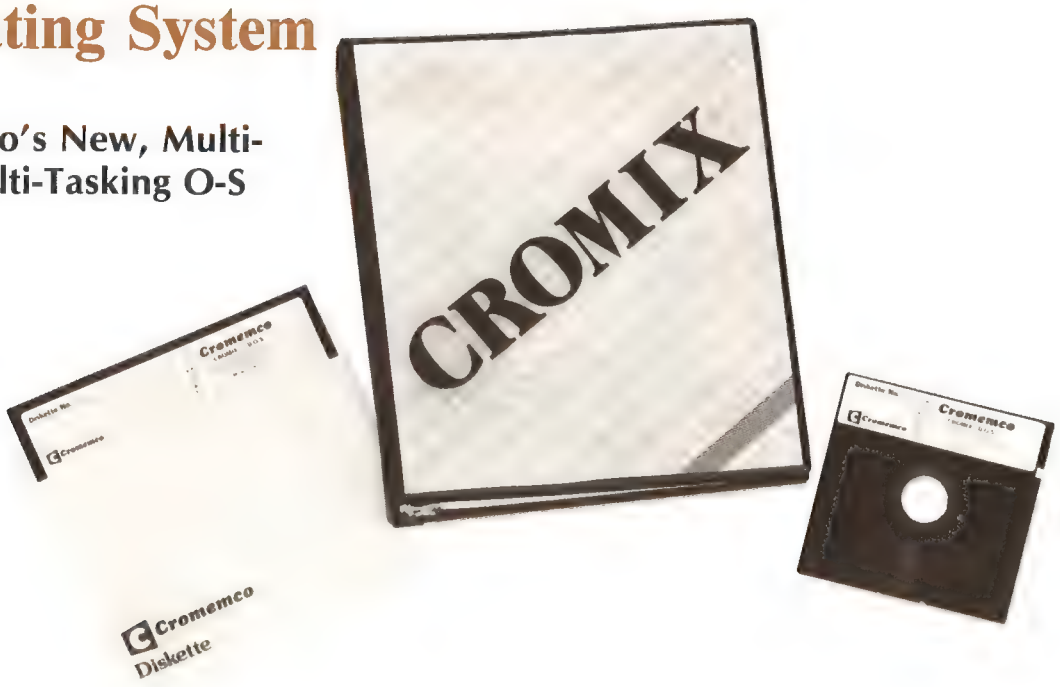
The software package includes two function libraries (one for use on a CDOS system and one for use on a CROMIX system), the Cromemco C Reference Manual, and a copy of The C Programming Language.

PRICES

Cromemco C Compiler on 5'' diskettes
(Model CCC-S) with extensive documentation) . . . $595.
Cromemco C Compiler on 8'' diskettes
(Model CCC-L) with extensive documentation) . . . $595.

CROMIX™ Operating System

Cromemco's New, Multi-User/Multi-Tasking O-S



- Multi-User capability
- Multi-Tasking capability
- Fast
- Many advanced features

THE FIRST WORKING UNIX* LOOKALIKE FOR 8-BIT MICROCOMPUTERS

In this powerful operating system you get advantages not found in any O-S ever developed for 8-bit microcomputers. These include • multi-user and multi-tasking capability, • hierarchical directories, • completely compatible file and device I/O, • extensive sub-system support with 8 computer languages and a number of application packages.

Moreover, you get these features at the fastest disk access speeds yet seen on a micro.

The Cromix Operating System is a lookalike to the popular UNIX* operating system developed by Bell Labs during the past 10 years. Differences are mainly in function names and implementation details.

UP TO SIX USERS

The memory in a **CROMIX** system is allocated in 64K banks, one bank per task. With bank 0 reserved for the operating system itself and bank 7 used for system initialization, up to six banks may be used to execute six concurrent tasks. Memory is allocated only when required by a task.

Since each user may execute one or more tasks, a CROMIX system will accommodate up to six users.

The Cromix Operating System also supports nearly all Cromemco CDOS software without modification. This is done through the use of a naming convention that lets CROMIX automatically recognize CDOS programs and execute them under the control of a simulator program.

The simulator takes care of translating CDOS system calls into equivalent CROMIX system calls, which perform the desired functions. In this way most Cromemco languages and programs written in them are immediately transportable to CROMIX.

FILE SYSTEM FEATURES

One of the key features of the Cromix Operating System is its file system comprised of hierarchical directories. The file system is a tree structure of three types of files: data files, directories, and device files. Device and file I/O is compatible among these file types. This means that input and output may be redirected from and to any source or destination completely interchangeably.

The tree structure allows different directories to be maintained for different users or functions with no chance of conflict. In addition, links may be established from directory to directory to allow the file to appear in multiple locations of the tree structure. Since a link to a file is merely a pointer to its location on the disk, all CROMIX links are of equal value.

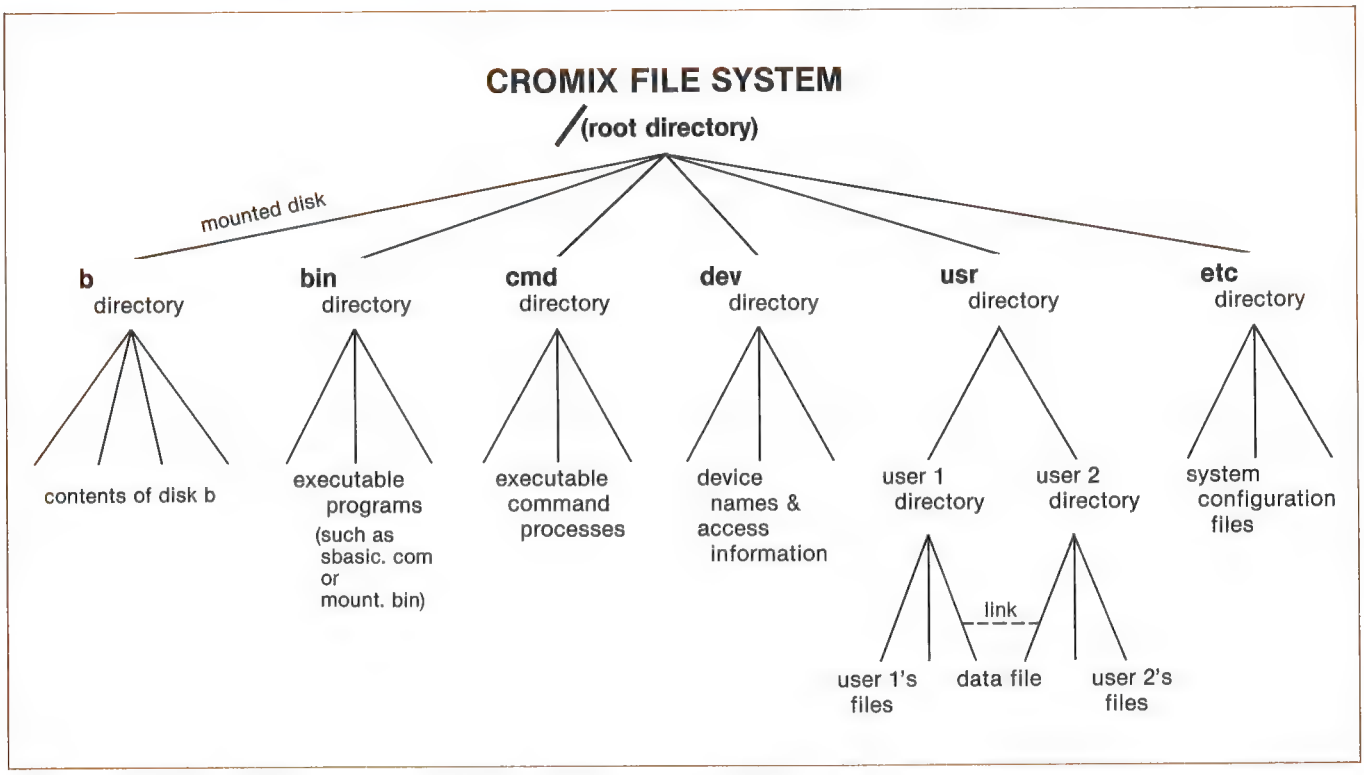
The tree structure of the file system also incorporates demountable volumes. This means that each mass storage device becomes a subset of the hierarchical directory structure of the single file system. Thus, files on all disk devices are addressed in an identical manner.

FILE PROTECTION

Due to the hierarchical structure of the file system, the CROMIX Operating System also maintains separate ownership of every file and directory. All files can thus be protected from access by other users of the system. Each file is individually protected by four separate access privileges in each of three categories of user of the CROMIX system.

*Trademark of BTL, Murray Hill, NJ

CROMIX™ Operating System (cont'd)



Of course, the operating system also allows a file to be accessed either exclusively or non-exclusively for each of the access privileges associated with that file. This means that application software can be easily developed which prevents the common problems of deadlock and mutual exclusion between users of the same file.

FAST

Finally, the flexible file system and generalized disk structure of the Cromix Operating System gives a disk address space in excess of **one gigabyte** per volume. This means that file size is limited only by the available disk capacity.

CROMIX access to disk files has also been optimized for speed, combining this flexible disk addressing, a large sector size, and optimized interleaving to produce average file access speeds far in excess of any yet implemented on microcomputers. Surprisingly, CDOS programs executing under the simulator program and the CROMIX Operating System will perform their file access and management faster than they do under CDOS itself!

STILL MORE FEATURES

The Cromemco CROMIX Operating System has all the features described here plus much more: a high-level command process language and extensive sub-system support including COBOL, FORTRAN IV, RATFOR, LISP, 32K and 16K BASICs, and C, the language of choice among system programmers.

AVAILABLE NOW

The CROMIX Operating System is tried and proved. It's available from stock on both 5" and 8" diskettes for use with all Cromemco 128K systems. One additional 64K memory card must be added for each additional user or task.

CROMIX SYSTEM CALLS

unique to Cromemco

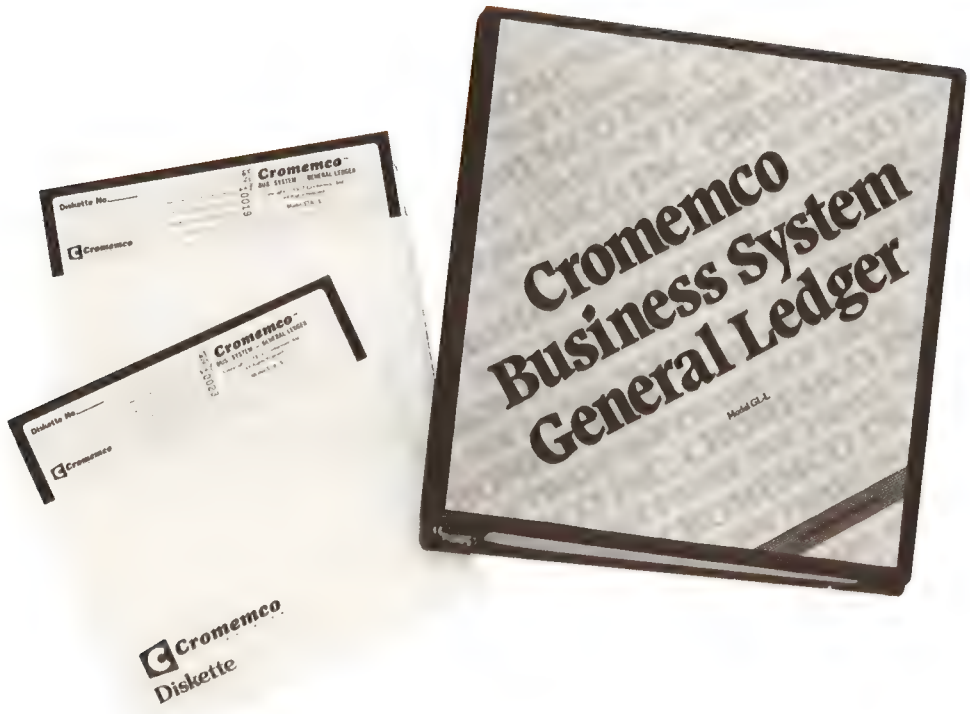
caccess	gettime
cchstat	getuser
chdup	makdev
chkdev	makdir
clink	mount
close	rdbyte
create	rdline
cstat	rdseq
cxexit	setdate
cxopen	setdir
delete	setgroup
error	setmode
exec	setpos
faccess	settime
fchstat	setuser
fexec	shell
flink	trunc
fshell	unmount
fstat	update
getdate	version
getdir	wait
getgroup	wrbyte
getmode	wrline
getpos	wrseq
getproc	

PRICES

CROMIX on 5" diskettes with documentation (Model CROMIX-S) $595

CROMIX on 8" diskettes with documentation (Model CROMIX-L) . . . . . $595.

General Ledger System



- **No computer programming knowledge needed**
- **Part of our integrated Business System Software**
- **Many special features**

TURNKEY SYSTEM

This is a turnkey system that requires no computer programming knowledge whatsoever.

It is intended for use by the business person or accountant, retailer, manufacturer, wholesaler, etc.

This GL System prints over 40 standard GL reports on ordinary computer paper.

Complete double-entry accounting is used and zero balance is automatically maintained at all times. Trial balance reports verify that debits and credits do balance but, more important, they allow audit for human omissions and illogical entries.

Our chart of accounts allows creating custom account structures using either existing numbers or setting up an improved structure. Hundreds of accounts or even more can be maintained. Account numbers have six digits. Provision is made for multi-line descriptions. Optional subaccounts or departmental subdivisions may be used.

There is ample room for expansion. Account balances are maintained for the month in process and for all months of the current and prior year.

This is a high speed, video-based interactive data processing system that requires neither transmittal forms nor punched cards. The system reduces tedious and redundant clerical tasks, and reduces the likelihood of common bookkeeping errors.

Advanced features of the Cromemco General Ledger System include:

- Separate high-speed receipt and disbursement journals
- Default account numbers
- Automatic control numbers
- A powerful multiple-double-entry general journal
- A flexible user-defined financial report generator that allows the user to create his own customized financial statements
- Complete file back-up and restoration capability

As with any computerized accounting system, we recommend that you obtain the advice of your accountant concerning the application of this package in your particular business. We also recommend that computers used in business applications be maintained under a service contract with your local Cromemco dealer.

PRICES

Cromemco General Ledger System on 5'' double-sided, double-density diskettes (Model GL-S) $995

Cromemco General Ledger System on 8'' double-sided, double-density diskettes (Model GL-L) $995

Accounts Receivable System

- **Saves time**
- **Saves money**
- **Keeps track of credit customers**
- **No computer programming knowledge needed**

PRINTS STATEMENTS FOR MAILING

This Accounts Receivable System keeps track of your credit customers, the cash they owe, and permits prompt billing and monitoring of collections.

The system prints statements ready for mailing when our standard statement forms are used. Statements for any customer are optional. Printing of account aging on each statement is also optional. No provision for invoice printing is included.

This system prints over 20 reports. It uses true double-entry accounting and automatically maintains zero balance at all times.

Once an invoice is entered into the system it remains there until it is removed or closed by a payment or an adjustment, regardless of the time involved. There are provisions for inputting up to 800 and even more invoices per month and numerous customers on each on-line file.

This AR System can also be used with our GL (General Ledger) System. Financial totals from the AR will automatically flow into the GL System each month.

This is a sophisticated turnkey package for experienced accountants, controllers, etc. No computer programming knowledge whatsoever is needed, however.

The AR System provides for creating and editing a "customer file." After input of outgoing invoices and customer payments, invoice dollars can be constantly monitored, and aged journals and customer reports generated. As mentioned above, an entered invoice remains in the system until it is specifically removed.

Advanced features of the new Cromemco AR System include:

- Cash discount
- Late payment or finance charge
- Credit memo
- Debit memo
- Partial payment

and

Bounced check provision

The AR System is a sophisticated turnkey package for experienced accountants, controllers, etc. Some accounting knowledge is preferable but not mandatory. No computer programming knowledge whatsoever is needed.

As with any computerized accounting system, we recommend that you obtain the advice of your accountant concerning the application of this package in your particular business. We also recommend that computers used in business applications be maintained under a service contract with your local Cromemco dealer.

PRICES

Cromemco Accounts Receivable System on 5" double-sided, double-density diskettes (Cromemco Model AR-S) $995

Cromemco Accounts Receivable System on 8" double-sided, double-density diskettes (Cromemco Model AR-L) $995

Accounts Payable System

- **Helps preserve cash**
- **Automatic accounting and check-writing**

This new Accounts Payable System helps keep track of vendors (suppliers) and their invoices, writes payables checks as appropriate, and provides summaries and reports for you.

The system provides for the creation and editing of a "vendor file," and the processing of invoices received from those vendors.

There is room for up to 800 and even more invoices per month and for several hundred or more vendors on each online file.

Using our check forms, this AP system will calculate and print checks that are fully protected with spelled-out amounts. Otherwise, it prints facsimile checks for manual transcription to actual checks.

The operator can select for payment all invoices and credit memos having a scheduled payment date prior to a certain date, or he can select all invoices from a specific vendor. A single check may pay, and list on its voucher stub, any number of invoices and credit memos being paid.

Our AP System produces over 15 other accurate and attractive reports. It uses true double-entry accounting and automatically maintains zero balance at all times.

When the AP System is used with our General Ledger System, financial totals from the AP System will automatically flow into the GL System each month. The design and operation of the system parallels that of our AR System so personnel learning one system will find it easy to learn and use the other.

This is a sophisticated turnkey system for experienced accountants, controllers, etc. Some accounting knowledge is preferable but not mandatory. No computer programming knowledge whatsoever is needed.

Other features of the Cromemco AP System include:

- Cash discount
- Finance charge
- Credit memo
- Debit memo
- Partial payment

  and
- Manually-written check provision
- Password protection of credit information and check-writing procedures
- Complete file back-up and restoration capability

As with any computerized accounting system, we recommend that you obtain the advice of your accountant concerning the application of this package in your particular business. We also recommend that computers used in business applications be maintained under a service contract with your local Cromemco dealer.

PRICES

Cromemco Accounts Payable System on 5" double-sided diskettes (Model AP-S) $995

Cromemco Accounts Payable System on 8" single-sided diskettes (Model AP-L) $995

Inventory System

- **Helps achieve better control of inventory**
- **Helps conserve cash**

ALSO SIMPLIFIES PHYSICAL INVENTORY

The Cromemco Inventory System simplifies and speeds inventory monitoring. It is especially suited to the small retailer or manufacturer who requires accurate monthly and annual inventory reports. It will handle up to 14,000 parts.

Once established, the Inventory Master File contains a record for each inventory stock item. Costs, prices, descriptions and size or unit information within each of these records allow printing of price lists and margin analysis reports.

The IN System also simplifies taking physical inventory. Book inventory levels can be quickly adjusted to match physical levels. Since minimum and maximum stock levels are recorded in the system, it will print suggested purchases and report oversupplies.

The system can separately monitor ABC inventory classes, and up to nine different financial inventory groups.

The IN System generates over 25 reports. No special forms need to be purchased.

This is a sophisticated turnkey system for accountants, and experienced purchasing, receiving, stockroom and shipping personnel. No accounting or computer programming knowledge whatsoever is needed.

Other features of the IN System include:

- Part numbers from 1 to 15 characters long
- Reports sorted by part number or by primary vendor
- Reports of month-to-date and year-to-date usages, costs, and sales
- Password protection of sensitive margin and cost data
- Direct on-line inventory status inquiry
- Complete file back-up and restoration capability.

As with any computerized accounting system, we recommend that you obtain the advice of your accountant concerning the application of this package in your particular business. We also recommend that computers used in business applications be maintained under a service contract with your local Cromemco dealer.

PRICES

Cromemco Inventory System on 5'' double-sided diskettes (Model IN-S) $995

Cromemco Inventory System on 8'' single-sided diskettes (Model IN-L) $995

SDI Graphics Software

EASY TO USE

This high-resolution color graphics software is easy to use since it uses simple BASIC- and FORTRAN-like commands.

In addition it offers enormous flexibility including a choice of color selection from a color menu of 4096 colors.

The subroutine calls provided are sufficient to fully utilize all the capabilities of the Cromemco SDI high-resolution graphics interface circuit card.

The subroutines allow the user such powerful capabilities as:

- fast line generation
- fast generation of shapes such as circles, rectangles and polygons
- area fill of these shapes in a designated color at video rates
- text generation and rotation
- the ability to open and close windows in the memory page being displayed
- the ability to simulate motion (animation)
- the ability to CLIP which eliminates problems that might arise from trying to plot outside the screen area
- the ability to scale the display area of the work page

This software system is designed to work with Cromemco's 48K two-port and 16K two-port memory boards and will operate with one or two pages of two-port memory. Two pages of 48K bytes of RAM are required for complete utilization of the full range of software options.

The programmer can generate and display an image in high resolution (756 x 482 points) as well as the 16-color medium resolution (378 x 241 points). In addition, the programmer has the choice of plotting explicitly (i.e., specifying within a call all needed location and color information) or implicitly (i.e., specifying needed location information with regard to an implied cursor).

Used with the Cromemco SDI high-resolution graphics interface board, this software package enables the user to select 16 colors for the color map from a color menu of 4096 colors. The contents of any color in the map can be modified by the user with a simple call define color command.

In addition, when programming in FORTRAN or Assembly language, the programmer has the option of creating color maps using the command CMAPGEN.

PRICES

High-Resolution Color Graphics Software package on 5" diskette (Model SGS-S) $595

High-Resolution Color Graphics Software package on 8" diskette (Model SGS-L) $595

Resident Software

- 16K Extended BASIC
- 3K Control BASIC
- Monitor

• CROMEMCO 16K Z-80 BASIC. This memory-resident version of our powerful 16K BASIC gives you all the features of our disk-based version (except for disk I/O).

This is a complete BASIC with 14 digits of precision, high execution speed, Print Using, Trace and many other capabilities.

16K resident BASIC occupies memory from 8000 through BFFF and is ideal for use as a stand-alone system.

• CROMEMCO 3K CONTROL BASIC. This is a compact integer-only BASIC interpreter designed specifically for microcomputer control applications. Control BASIC allows the user to read and write specific memory and I/O locations and call machine language subroutines.

There are 36 commands and functions available.

Control BASIC requires 3K of memory space beginning at location E400 hex.

• CROMEMCO Z-80 MONITOR. This Monitor is a powerful tool for use in software development. It allows the user to examine and alter register and memory contents, set program breakpoints, move blocks of memory, program PROMs (using the Cromemco BYTESAVER II), and read and punch paper tapes — all under keyboard control.

The Monitor resides in memory space from E000 to E3FF hex. and includes 12 commands.

PRICES

16K BASIC in PROM (Model 16KB-1608) $400
3K Control BASIC (Model CB-308) in ROM . . $75
Model ZM-108 in 2708 PROM $25

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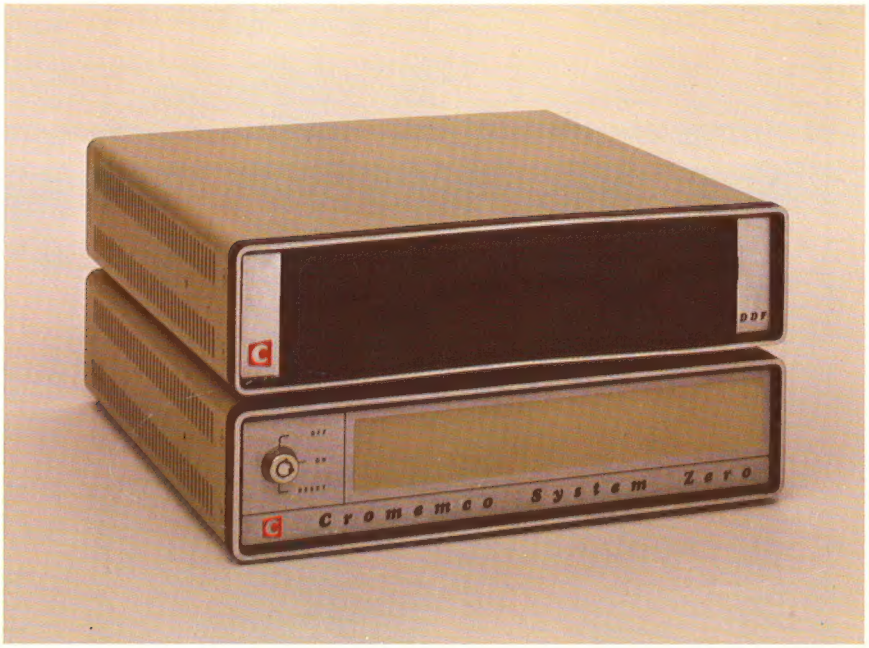

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